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NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

THESIS

**A RETENTION ANALYSIS OF UNITED STATES
NAVAL ACADEMY IMMEDIATE GRADUATE
EDUCATION PARTICIPANTS**

by

Maria V. Navarro

March 2006

Thesis Advisor:
Co-Advisor:

Stephen L. Mehay
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**A RETENTION ANALYSIS OF UNITED STATES NAVAL ACADEMY
IMMEDIATE GRADUATE EDUCATION PARTICIPANTS**

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Lieutenant, United States Navy
B.S., University of South Carolina, 1998

Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT

from the

**NAVAL POSTGRADUATE SCHOOL
March 2006**

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ABSTRACT

This thesis studied the retention of United States Naval Academy Voluntary Graduate Education Program (VGEP) and Scholarship participants in graduating classes of 1983-1998. The comparison group of non-participants consisted of USNA graduating classes 1983-1998 with an Academic Quality Point Rating (AQPR) comparable to the early graduate education students. AQPR was used in order to make the academic backgrounds similar for the participants and non-participants. The retention behavior of program participants and non-participants was compared to determine if participation in early graduate education affected retention. The models analyzed retention to each year of service between six and twelve years. In the retention models for unrestricted line officers, both VGEP and Scholarship had a small positive effect on retention to 7 YCS. Although the adjusted differences in retention are not large in magnitude, the results dispel the notion that early graduate education programs are used as vehicles by junior officers to facilitate transition to the civilian labor market following expiration of their initial service obligation. No changes to the service obligations for these programs were recommended.

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I. INTRODUCTION

Graduate education is an important part of an officer's professional development in the U.S. Navy. A highly educated officer is considered an essential tool in keeping our military at the highest state of readiness. Rapid technological advances in weapons systems mean that the advanced education of officers is becoming increasingly important. Many officers receive graduate education after they have attended their service schools and have spent some time qualifying at operational commands throughout the fleet. However, for some the opportunity comes immediately after commissioning.

Though not a primary method of providing graduate education, immediate graduate education programs offer newly-commissioned ensigns the opportunity to earn a master's degree before attending their chosen service schools. These programs are competitive and only top graduates are normally chosen. Multiple programs exist for both United States Naval Academy (USNA) and Naval Reserve Officer Training Corps (NROTC) midshipmen. Each program differs in eligibility requirements, cost to the Navy, and additional service obligation.

Newly commissioned Naval Academy officers can attend graduate school prior to attending their service schools by two different means, the Voluntary Graduate Education Program (VGEP) and the civilian scholarship graduate education program (to be referred to as the Scholarship program). Both programs are highly competitive and accept less than 50 students of the roughly 1,000 USNA graduates each year. A third program, the Immediate Graduate Education Program (IGEP) was introduced in 1999, allowing newly commissioned officers the opportunity to attend the Naval Postgraduate School (NPS) or Air Force Institute of Technology (AFIT) immediately after commissioning. Due to the recent inception of the program, and the focus in this thesis on retention and promotion, the IGEP program is not included in this study.

A. VOLUNTARY GRADUATE EDUCATION PROGRAM (VGEP)

The Chief of Naval Operations approved the Voluntary Graduate Education Program (VGEP) in 1983. The purpose of VGEP is to accelerate the education of

exceptional midshipmen and to qualify them for a master's degree and for a Navy-approved subspecialty code early in their career. VGEP is entirely voluntary and is independent of fleet-wide officer graduate education programs. A maximum of 20 USNA midshipmen are selected annually for the program. To be eligible, students must meet the following academic, aptitude for commission, and conduct requirements: (1) minimum Cumulative Quality Point Rating (CQPR) of 3.2 or higher; (2) minimum grade of "B" or better in aptitude for commissioning; and (3) a grade of "B" or better in conduct. If selected, these minimum requirements must be maintained throughout the student's time at USNA.

Midshipmen selected for VGEP begin their graduate studies during their last year at USNA. Through course validation, course overloading, and summer school, first-class midshipmen are permitted to take graduate courses at a local university, such as the University of Maryland. This gives students the opportunity to finish their graduate degree within the one calendar year allotted by the VGEP program (including up to seven months after commissioning). After graduating from USNA, students complete their graduate studies at the Navy's expense. The Navy pays a maximum of \$10,000 in direct tuition costs and VGEP students are responsible for paying any tuition and costs that exceed this cap. For example, VGEP students must pay for their own transportation, transcripts, fees and textbooks.

VGEP requires students to agree to an additional service obligation in return for the Navy-funded graduate education. The minimum service requirement (MSR) for non-aviation USNA graduates is five years and between eight and ten years for aviation officers. For USNA classes 1983-1986 there was no additional service obligation for VGEP participants beyond the minimum service requirement. From 1987-2000, the service obligation was changed and set equal to three times the length of education received after commissioning, to be served consecutively. In 2001, the service obligation reverted back to being served concurrently (as in 1983-1986).

B. SCHOLARSHIP PROGRAM

The USNA Scholarship program allows newly commissioned ensigns to accept civilian scholarships to attend graduate school at universities of their choosing. The Navy covers only pay and allowances for the ensign. Students are responsible for any education costs exceeding the value of their scholarships and are not eligible for Navy tuition assistance. Students selected to participate in the scholarship program begin their studies upon graduation and may only participate in the scholarship program for a maximum of two years.

To be eligible, students must meet the following academic, aptitude for commission, and conduct requirements: (1) minimum Cumulative Quality Point Rating (CQPR) of 3.2 or higher; (2) minimum grade of “B” or better in aptitude for commissioning; and (3) a grade of “B” or better in conduct. If selected for the program, these minimum requirements must be maintained throughout the student’s time at USNA.

The Scholarship program requires the student to agree to an additional service obligation in return for the Navy-funded graduate education. For USNA classes 1983-1989 the additional service obligation incurred was three times the length of the scholarship program, to be served consecutively. In 1990, the service obligation incurred was changed to be served concurrently.

C. RESEARCH QUESTIONS

The purpose of this thesis is to analyze the retention behavior of immediate graduate education program participants, specifically USNA graduates who participated in the VGEP and Scholarship programs. This thesis will address the potential benefits to the Navy, including the retention effects, of the early graduate education programs. The retention behavior of program participants in particular is a concern due to the cost to the Navy of immediate graduate education programs and the perception that the program may provide incentives for junior officers to leave the Navy. Currently it is unknown how long program participants remain in the Navy past their initial service obligations. Knowing the retention behavior of participants will help Navy planners in determining whether immediate graduate education yields a positive return on the Navy’s

investments. However, retention is only indicator of performance. If a participant's promotion and performance outcomes can be causally linked to the immediate graduate education program, Navy planners can make recommendations on when to incorporate graduate education in an officer's career.

In order to evaluate whether these programs are beneficial to the U.S. Navy, this thesis will analyze the VGEP and Scholarship programs for the USNA graduating classes of 1983-1998. Specifically, the thesis will attempt to answer the following question: Do immediate graduate education participants retain at a higher rate than non-participants?

D. DATA AND ANALYSIS

Data for program participants was obtained through the USNA Graduate Education Program Office, which maintains the files on all USNA graduate education program participants. Data for USNA midshipmen in the graduating classes 1983-1998 was obtained through the USNA Office of Institutional Research, which maintains a database on all USNA midshipmen and alumni. Navy Officer Master and Loss Files and Promotion History Files (through 2005) were obtained from the Navy Personnel Command via Professor William Bowman at the Naval Academy. Statistical analysis of the data was used to answer the research questions. Only officers with complete data were analyzed.

E. LIMITATIONS

There were certain limitations to this study. This study analyzed only USNA graduates in the 1983-1998 class years. Naval Reserve Officer Training (NROTC) program commissioned officers were not included in the study due to the lack of availability of data. It is assumed that officers from both USNA and NROTC programs are equal in educational background; however, NROTC officers do not participate in VGEP.

One issue that may have affected the analysis during the 1983-1998 period was the military downsizing in the early 1990's which resulted in a large departure of officers. It is assumed that officers in whom the Navy invested in graduate education

would be higher quality, career-oriented officers who would not have been intentionally forced to resign during the downsizing. However, it is possible that these high quality officers with graduate degrees were more marketable in the civilian market and may have left the Navy at a higher rate. The multivariate models estimated in the thesis attempt to account for major policy changes and external events that occurred during the 16-year period covered by the data.

Chapter II contains a brief history of Navy graduate education and a background literature review. Chapters III and IV describe the statistical approach and data analysis used to answer the research questions proposed in Chapter I. The retention findings are summarized and conclusions are presented in Chapter V.

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II. BACKGROUND AND LITERATURE REVIEW

This chapter provides a brief history of the Navy's graduate education program.

A. HISTORY OF NAVY GRADUATE EDUCATION

Rapid technological advance...did not come by accident, nor did it come overnight. It has been the result of educating carefully selected officers in each succeeding generation of officers...The naval leaders of 50 years ago...recognized that ships and naval weapons were becoming more complex, that their proper employment at sea would require officer who were familiar not only with the age-old profession of the sea, but who could understand and could use effectively the complex weapons of the years to come.

-Admiral Arleigh Burke, Chief of Naval Operations

Naval Postgraduate School 50th Anniversary

The Navy's graduate education program officially began in 1909 by the direction of the Secretary of the Navy (SECNAV) in an attempt to produce technically trained officers. After the Civil War (1861-1865), the need for technically proficient officers became apparent when the advances in naval technology developed faster than a Naval officer's education did. To correct these deficiencies, the Navy looked to foreign navies to assist in officer development. In the 1879, the Navy began the practice of sending two or more Naval Academy graduates to study advanced engineering at Britain's Royal Naval College. In 1897, when the British Admiralty decided to no longer admit foreign students to its naval college, a postgraduate naval architecture program was established at the United States Naval Academy. (Simons) This program was specifically designed for members of USNA's cadet engineers and "was the first true graduate education program conducted by the Navy within its facilities." (Rilling, 78) Unfortunately, this program ended with the elimination of the Navy's Engineer Corps in 1899. (Simons)

In 1909, the lack of postgraduate education led the Navy to establish a School of Marine Engineering at the Naval Academy. The first few years of study at the School of Marine Engineering were difficult due to the lack of resources and classroom space.

There were two small classrooms housed in the Steam Engineering Department, without permanent faculty and without adequate resources. In 1912, the program was reorganized, leading to a change in the school's name to the Postgraduate Department.

The reorganization allowed the curriculum to be expanded beyond Naval Engineering. The new curriculum included Marine Engineering, Electrical Engineering, Radio Telegraphy, Ordnance and Gunnery, Naval Construction, and Civil Engineering. (Rilling, 95) This gave the Navy the flexibility it needed to produce a diverse officer corps.

The new curriculum placed additional strain on the cramped facilities, forcing the Postgraduate Department to use classrooms belonging to the Naval Academy. The constant shifting of classes and confusion among the schools led Superintendent Lieutenant Commander Morton to request new and separate facilities for USNA and the Postgraduate Department. The request was dated September 14, 1914, but was not granted until 1951. (Rilling, 105)

In 1947, Public Law 302 authorized the Navy to purchase land in Monterey, California and to establish the Naval Postgraduate School (NPS). This facility was to be physically separate from the Naval Academy. The move from Annapolis to Monterey was officially completed in 1951.

In 1911, Assistant Secretary of the Navy, the Honorable Beekman Winthrop stated: "There will some day be a postgraduate course to call all of the officers of the Navy together. This school is the beginning, and may be the one on which the Navy Department of the future may have to depend." This statement, although true, was not feasible. There was no way "all of the officers of the Navy" could attend the Naval Postgraduate School. Although NPS was, and still is, the Navy's primary graduate education facility, additional civilian institutions are utilized for advanced degrees to accommodate the increased demand for graduate education across the fleet. Other types of graduate education available to officers include tuition-assistance and Graduate Education Voucher (GEV) for own-time education, and immediate graduate education (i.e., VGEP and Scholarship).

As the number of graduate education programs has increased, along with the cost to the Navy of these programs, there has been growing concern as to the effect of retention after earning a master's degree. To offset the probability of an officer leaving the Navy after receiving fully-funded graduate education, the Navy imposed an additional service obligation. The Navy requires officers who receive fully-funded graduate education to serve on active duty for an additional period of time to be determined by the length of the graduate program. (OPNAVINST 1520.23B) The additional service is to be served in a valid subspecialty position within two tours following graduation. This allows the Navy the opportunity to place the officer in a billet where their degree will be utilized. The additional service obligation requirement placed on officers ensures that fully-funded graduate education participants serve additional time to "payback" the cost of their education. Although these paybacks have been added, retention may still be an issue since the payback tours can be completed immediately after completing their graduate education studies.

B. PREVIOUS STUDIES

Graduate education encourages "higher levels of professional knowledge and technical competence; provides incentives for recruitment and retention of personnel with ability dedication, and capacity for growth; and recognizes educational aspirations of individuals." (OPNAV 1520.23B) Many studies have analyzed the relationship between graduate education of Navy officers and retention and promotion to determine if this statement is true. The advantages of fully funded graduate education have been seen in Navy officer promotion and retention in numerous studies in recent years (Mehay, 2005; Jordan, 1991; Conzen, 1999; Bowman and Mehay, 1999, 2004; Milner, 2003). The advantages of graduate education have also been seen in the civilian labor market.

The value of graduate education in the civilian workforce has been found to be similar to the value of graduate education in the military. In 2005, Stephen Mehay analyzed the value of graduate education in the military as compared to the civilian labor market. Using civilian economic data, Mehay found that there was evidence of a positive economic return to education in the civilian labor market. Corporations are increasingly

viewing advanced education as critical to becoming successful. Continuous learning was also viewed as a strategic investment to increase capability and competitive advantage. The increased knowledge among employees helped increase productivity, which in turn increased salaries. Based on analysis of wage and salary data, Mehay (2005) concluded that “the Return on Investment (ROI) to a Master’s degree in the United States varies between 7%-20%, with a higher ROI for technical degrees and MBA’s.”

In the same study, Mehay analyzed the impact of advanced education on U.S. federal government employees. He found that there was a positive impact of advanced degrees on performance and career development. Federal government employees with advanced degrees have a 6% higher probability of receiving top performance ratings, an 11% higher probability of being selected for a supervisor position, and had a 5%-9% higher annual salary.

Jordan (1991) analyzed the effect of graduate education on the retention of General Unrestricted Line Officers (currently the Human Resource community) to the Lieutenant Commander (O-4) and Commander (O-5) boards. Using Officer Promotion and Officer Master Loss files for fiscal years 1981 to 1990, Jordan found that graduate education had a positive impact on the probability of retention through the Lieutenant Commander promotion board. However, Jordan did not take into account that obligated service of three years is incurred for attending NPS. Most of the officers already have served a minimum of five years when they arrive at NPS. Since most curricula at NPS are two years in length, the majority of NPS graduates begin their obligated service at the seven year mark. That means that after serving their obligated service, these officers have served at least ten years. The ten year point is where many are screened for Lieutenant Commander so most officers with graduate degrees remain on active duty long enough to reach this milestone. However, possession of a graduate degree does not guarantee promotion.

Conzen (1999) also analyzed the impact of fully funded graduate education on the retention of Naval Officers. Using the Officer Master Records for fiscal years 1992 through 1997, samples were obtained to determine the probability of an officer remaining on active duty once their mandatory educational obligation was complete. A maximum

likelihood logit model found that funded graduate education may have an effect on promotion, since the career progression of officers with funded graduate education differed from officers who did not receive funded education. Conzen also found that there was no impact of graduate education on retention past the ten-year point in an officer's career. However, it was found that "the proportion of officers with funded Master's Degrees leaving the Navy was consistently lower than that of those who earn a Master's Degree on their own or have only a Bachelor's Degree."

A study conducted by William R. Bowman and Stephen L. Mehay in 2004 on the "Return on Investment in Navy Graduate Education", analyzed the benefits of three alternative Navy graduate education programs: Navy fully-funded degree, off-duty degree, and no degree. To simulate the effect of graduate degrees on officer career progression, data from the Surface Warfare Officer (SWO) community was analyzed. The analysis simulated retention and promotion of SWO's by master's degree status: fully-funded, off-duty, and no degree. The retention and promotion rates of fully-funded degree recipients were higher than those receiving off-duty degrees or no degree. This higher retention and promotion allows the Navy to reduce the number of accessions and saves the associated commissioning and training costs. Bowman and Mehay also found that officers with graduate degrees tend to stay in the Navy longer than non-graduate educated officers since graduate education serves as a cost-effective retention tool. The retention analysis found positive net benefits of fully-funded programs.

Milner (2003) conducted a cost-benefit analysis of early graduate education programs for USNA graduates. The study focused on USNA graduates between years 1988 through 1996 who participated in the VGEP and Scholarship program. Using historical records from USNA and the Officer Master Loss file, Milner compared VGEP and Scholarship participants to class members with similar Order of Merit (OOM). The study found that for the pooled sample of all graduates included in the study, both VGEP and Scholarship programs had a positive effect on retention.

Milner did not take into account the additional obligated service for VGEP and Scholarship participants and did not include aviators or Naval Flight Officers (NFOs) in his sample. But between 1983 and 1986, there was no additional service obligation for

VGEP. Between 1987 and 2000, VGEP participants incurred an additional service obligation of three times the length of education received after commissioning, to be served consecutively. Since most VGEP participants earn their master's degrees within seven months of commissioning, the additional obligated service was approximately 21 months, making the participants minimum service requirement seven years vice five years. Between 1983 and 1989, Scholarship participants incurred an additional service obligation of three times the length of the period of the scholarship program, to be served in addition to any other service obligation. The maximum length of the scholarship program is 24 months, making the minimum service requirement for participants between 1983 and 1989 between eight and eleven years. The retention effect that Milner attributed to the immediate graduate education programs may simply have reflected the changes over time in policies mandating additional obligated service.

Of the 292 VGEP and Scholarship participants included in Milner's study, 30 percent (87 of 292) of them were Aviators and NFOs. Removal of these program participants eliminated a large portion of the population of immediate graduate education participants from his study. Moreover, the service obligation of Naval aviators differs from other URL officers so that the estimated retention effect of immediate graduate education may differ between the two groups. If so, the retention effect derived from models that include only non-aviators will provide a biased estimate of the true retention effect for Navy officers.

C. SIMILARITIES AND DIFFERENCES

The methodology of this study is similar to Milner's 2003 immediate graduation study. However, there are significant differences in the data, methodology, the control variables used in the regression models and the comparison groups. The first difference is that the data set used in this study includes additional years of USNA graduates. The data set covers graduates in the class years between 1983 and 1998, which provides 16 years of data vice 9 years of data in the Milner study (1988 to 1996). A larger range of years gives a more reliable program effect because it captures periods when the service obligation for graduate education was served concurrently and periods when it was

served consecutively. It also allows more years and retention periods to be analyzed. Retention to later years of service was analyzed to determine program participant career retention patterns as well as retention to MSR. The data set also includes aviators and naval flight officers, which were not included in Milner's study.

The multivariate models in this study are estimated separately for VGEP participants and Scholarship participants. Dividing the program participants allows the author the flexibility of changing the comparison groups according to the criteria for selecting candidates for each program. It also allows the changes in the service obligation for each program to be taken into account in the regression models. For USNA classes 1983-1986 there was no additional service obligation for VGEP participants beyond the minimum service requirement from the USNA commission. From 1987-2000, the service obligation was changed and set equal to three times the length of education received after commissioning, to be served consecutively. In 2001, the service obligation was changed back to be served concurrently. Between 1983 and 1989, Scholarship participants incurred an additional service obligation of three times the length of the period of the scholarship program (normally 2 years), to be served in addition to any other service obligation. The maximum length of the scholarship program is 24 months, making the minimum service requirement for participants between 1983 and 1989 between eight years (for URL officers) and eleven years (for aviators). The service obligation changed for Scholarship participants in 1990 from consecutive service to concurrent service, meaning that the service obligation incurred for participating in the Scholarship program could be served at the same time as the service obligation for the USNA education. These changes in service obligation need to be included and captured in the study to ensure an accurate analysis of voluntary retention.

The comparison groups were also created based on cumulative academic quality point rating (AQPR), which is equivalent to one's college GPA. Milner used Order of Merit (OOM) as the primary criterion for creating comparison groups. Order of merit is a measure used by USNA to rank graduating midshipmen. It includes academic and military performance grades, conduct, and physical education. OOM was not used in this study because it is not used by the USNA graduate education selection committee to determine eligibility for applicants to the VGEP and Scholarship programs. It cannot be

used by the graduate education selection because the rankings for OOM are assigned at graduation, long after the graduate selection committee makes its decisions, which occur in the midshipman's junior year.

III. DATA AND METHODOLOGY

This chapter describes the database used in the empirical analysis in the thesis. It also describes the specification of the multivariate logit estimating models.

A. DATA DESCRIPTION

Fleet data and USNA archival data were used for this analysis. Data for program participants were obtained through the USNA Graduate Education Program Office, which maintains the files on all USNA graduate education program participants. Data for all USNA midshipmen in the graduating classes 1983-1998 were obtained through the USNA Office of Institutional Research, which maintains a database on all USNA midshipmen and alumni. Navy Officer Master and Loss Files and Promotion History Files were obtained from the Navy Personnel Command via Professor William Bowman at the Naval Academy. The loss files track retention of officers through 2005. The pertinent data from these files on all USNA graduates were merged into a single database for analysis in this study.

Due to the small number of program participants in a given year, a time period covering several years was used to increase the size of the sample and to increase variation in participant attributes. Year groups 1983 through 1998 were used because this contains a large sample of graduates who have passed the five-year minimum service requirement window. Once officers have completed their minimum service requirement they make the decision on whether to remain on active duty or resign their commission. This time period also was used because VGEP began in 1983. The retention behavior of VGEP and Scholarship participants was compared to the retention of a selected control group who are comparable to the graduate education recipients but who did not participate in the programs.

The study specifically focused on USNA graduates who were commissioned as ensigns in the Navy. Late graduates who did not graduate with their class were not included in this study due to the lack of grade information. This resulted in the

elimination of 229 graduates, including one Scholarship participant. Also, USNA graduates who selected Marine Corps were not included in the study. This resulted in the elimination of 2,406 graduates, including 17 VGEP and 3 Scholarship participants.

In order to create the comparison group for VGEP participants, Cumulative AQPR's of participants were examined to determine the qualifying cut-off point. The mandated minimum AQPR for the VGEP program is 3.2; however, 11 VGEP participants had AQPR's below the minimum. These 11 participants were granted waivers to apply for the VGEP program. The minimum AQPR observed in the data for VGEP students was 2.99. Thus, in creating the comparison group graduates with CUMAQPR's greater than 2.99 were included in the data set. This cut-off point was used to create the relevant VGEP comparison group. The final VGEP data set contained 4,532 officers, consisting of 191 VGEP participants and 4,341 non-participants.

Two control groups were created: one for VGEP students and one for Scholarship students. In order to create the comparison group for Scholarship participants, Cumulative AQPR's of recipients were examined to determine the qualifying cut-off point for applicants. The mandated minimum AQPR for the Scholarship program is 3.2; however, two Scholarship participants had AQPR's below the minimum. These two participants were granted waivers to apply for the Scholarship program. The minimum AQPR observed in the data was 2.86. Thus, in creating the comparison group only graduates with CUMAQPR's greater than 2.86 were included the data set. The final Scholarship data set contained 5,746 officers, consisting of 269 Scholarship participants and 5,477 non-participants.

B. VARIABLES

Table 1 lists the names and descriptions of variables that were created for the statistical analysis. All of the variables are binary.

Table 1 Variable Descriptions

Variable	Variable Description
INATSIX	=1 if member on active duty 6 years after graduation; 0=1 if not
INATSEVEN	=1 if member on active duty 7 years after graduation; 0=1 if not
INATEIGHT	=1 if member on active duty 8 years after graduation; 0=1 if not
INATNINE	=1 if member on active duty 9 years after graduation; 0=1 if not

INATTEN	=1 if member on active duty 10 years after graduation; 0=1 if not
INATELEVEN	=1 if member on active duty 11 years after graduation; 0=1 if not
INATTWELVE	=1 if member on active duty 12 years after graduation; 0=1 if not
VGEP	=1 if VGEP participant, =0 if not a VGEP participant
SCHOLAR	=1 if Scholarship participant, =0 if not a Scholarship participant
FEMALE	=1 if Female, =0 if not Female
BLACK	=1 if Black, =0 if not Black
HISPANIC	=1 if Hispanic, =0 if not Hispanic
ASIAN	=1 if Asian, =0 if not Asian
OTHERMINORITY	=1 if Other Minority, =0 if not Other Minority
MAJGRP1	=1 if degree was in Major Group 1, =0 if degree was not in Major
MAJGRP2	=1 if degree was in Major Group 2, =0 if degree was not in Major
MAJGRP3	=1 if degree was in Major Group 3, =0 if degree was not in Major
PRIOR1	=1 if Prior Enlisted, =0 if not Prior Enlisted
SWO	=1 if Surface Warfare Officer, =0 if not Surface Warfare Officer
PILOT	=1 if Pilot, =0 if not Pilot
NFO	=1 if Naval Flight Officer (NFO), =0 if not NFO
SUB	=1 if Submariner, =0 if not Submariner
SPECWAR	=1 if Special Warfare Officer, =0 if not Special Warfare Officer
RLINE	=1 if Restricted Line Officer, =0 if not Restricted Line Officer
YR83	=1 if class of 1983, =0 if not class of 1983
YR84	=1 if class of 1984, =0 if not class of 1984
YR85	=1 if class of 1985, =0 if not class of 1985
YR86	=1 if class of 1986, =0 if not class of 1986
YR87	=1 if class of 1987, =0 if not class of 1987
YR88	=1 if class of 1988, =0 if not class of 1988
YR89	=1 if class of 1989, =0 if not class of 1989
YR90	=1 if class of 1990, =0 if not class of 1990
YR91	=1 if class of 1991, =0 if not class of 1991
YR92	=1 if class of 1992, =0 if not class of 1992
YR93	=1 if class of 1993, =0 if not class of 1993
YR94	=1 if class of 1994, =0 if not class of 1994
YR95	=1 if class of 1995, =0 if not class of 1995
YR96	=1 if class of 1996, =0 if not class of 1996
YR97	=1 if class of 1997, =0 if not class of 1997

YR98	=1 if class of 1998, =0 if not class of 1998
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C. DEFINITION OF TERMS

The following definitions are offered to help clarify the variables and the statistical models.

Cumulative Academic Quality Point Rating (CUMAQPR): CUMAQPR measures the overall academic performance of midshipmen. It is a continuous variable ranging from 0.00 to 4.00 with a 2.0 being the lowest score a midshipman can have to graduate. This score is equivalent to one's GPA in college or high school.

For the purpose of this study, CUMAQPR has been changed to a binary variable. The minimum AQPR for VGEP and Scholarship applicants is 3.2, however, 13 participants had AQPR's below the minimum. This resulted in a minimum AQPR of 2.99 for VGEP participants and a minimum AQPR of 2.86 for Scholarship participants. Graduates with a CUMAQPR of less than 2.86 were deleted from the final data sets.

Major Groups (MAJGRP): Academic majors are divided into three group majors: Major Group 1 covers Engineering degrees; Major Group 2 covers Math and Science degrees; and Major Group 3 covers Humanities and Social Science degrees.

Order of Merit (OOM): OOM is a measure used by USNA to rank graduating midshipmen. It includes academic and military performance grades, conduct, and physical education.

Program participants: USNA graduates from 1983 to 1998 who participated in either the VGEP or the Scholarship program.

Minimum Service Requirement (MSR): MSR varies by community and service assignment. All non-aviation graduates have an MSR of five years. Aviation graduates have an MSR between eight and ten years depending on their specific aviation training pipeline.

Loss Record (LOSSREC): is defined as those USNA graduates from 1983-1998 who have left the service.

D. PARTICIPANT CHARACTERISTICS

Table 2 shows the number of program participants by year as well as the total number of USNA graduates for each class. As Table 2 shows, the Scholarship program expanded in the 1990's, whereas the VGEP program remained fairly constant in size.

Table 2 Program Participants by Year

YEAR	VGEP	SCHOLARSHIP	GRADUATING CLASS TOTAL
1983	6	9	1080
1984	9	6	1004
1985	14	9	1046
1986	18	10	1029
1987	9	11	1036
1988	12	11	1060
1989	13	9	1081
1990	11	13	1008
1991	16	13	955
1992	11	19	1031
1993	14	31	1066
1994	9	27	940
1995	15	26	916
1996	12	26	946
1997	10	24	952
1998	12	25	923
Total	191	269	16073

Table 3 shows program participants' demographic characteristics. Demographic characteristics were included in the retention models to determine if demographic factors affect retention. The table shows that the majority of participants are Caucasian males with an engineering (Group 1) major.

Table 3 Program Participant Characteristics

Descriptor	VGEP (N=191)	Scholarship (N=269)	Total (N=460)
Male	181	254	435
Female	10	15	25
Caucasian	176	248	424
Black	2	7	9
Hispanic	4	6	10

Asian	6	6	12
Other Minority	3	2	5
Major Group 1	63	182	245
Major Group 2	40	58	98
Major Group 3	88	29	117
SWO	36	47	83
Pilot	51	54	105
NFO	18	20	38
SUB	68	125	193
SPECWAR	5	9	14
Restricted Line	13	14	27
CUMAQPR_≥ 3.2	180	267	447
CUMAQPR<3.2	11	2	13
Prior Enlisted	12	19	31

E. DESCRIPTIVE STATISTICS

Table 4 compares the calculated retention rates for VGEP participants and non-participants by community and years of service. Surface Warfare Officers and Submarine Warfare Officers who participated in VGEP retained at a higher rate than non-participants. However, Special Warfare Officers who participated in VGEP retained at a much lower rate than non-participants. Note, however, the number of SPECWAR officers who participated in VGEP is very small (5).

Table 4 URL Retention by Community for VGEP Participants and Comparison Group

	SWO (control group)	VGEP SWO	SUB (control group)	VGEP SUB	SPECWAR (control group)	VGEP SPECWAR
7 YCS	56.30%	72.22%	76.01%	77.61%	68.13%	60%
8 YCS	42.05%	52.78%	46.22%	49.25%	51.25%	20%

9 YCS	32.74%	50%	31.93%	40.3%	43.13%	20%
10 YCS	26.62%	41.67%	28.59%	32.84%	35%	0%

Table 5 compares the calculated retention rates of VGEP participants and non-participants by community and years of service. Pilots and NFOs who participated in VGEP retained at a higher rate than non-participants. This higher retention could be associated with the longer service obligation incurred by Pilots and NFOs who participated in VGEP.

Table 5 Pilot Retention by Community for VGEP Participants and Comparison Group

	PILOT (control group)	VGEP PILOT	NFO (control group)	VGEP NFO
10 YCS	45.36%	51.00%	43.10%	44.40%
11 YCS	31.08%	39.20%	34.97%	44.40%
12 YCS	23.47%	29.41%	29.49%	38.90%

Table 6 compares the calculated retention rates of Scholarship participants and non-participants by community and years of service. Surface Warfare Officers who were Scholarship participants retained at a higher rate to nine years of service. After nine years of service, the retention rate drops below the control group. For Submarine Warfare Officers who were Scholarship participants, the retention rate was higher to eight years of service. After eight years of service, the retention rate drops below that of non-participants. Special Warfare Officers who were Scholarship participants also have a higher rate of retention until year nine. After nine years of service, the retention rate drops below those who were non-participants.

Table 6 URL Retention by Community for Scholarship Participants and Comparison Group

	SWO (control group)	SCHOLAR SWO	SUB (control group)	SCHOLAR SUB	SPECWAR (control group)	SCHOLAR SPECWAR
7 YCS	56.57%	76.1%	62.39%	90.40%	65.25%	77.78%
8 YCS	41.47%	63.83%	42.85%	72%	49.74%	55.56%
9 YCS	33.87%	40.43%	31.87%	30.40%	42.49%	44.44%
10 YCS	28.51%	27.76%	28.40%	24.80%	35.23%	22.22%

Table 7 compares the tabulated retention rates of Scholarship participants and non-participants by community and years of service. Pilots who participated in Scholarship retained at a higher rate than non-participants. This higher retention could be associated with the longer service obligation incurred by pilots who participated in the Scholarship program. NFOs who participated in Scholarship had higher retention rates than non-participants up to year ten; however, the retention rate dropped below the control group after ten years of service.

Table 7 Pilot Retention by Community for Scholarship Participants and Comparison Group

	PILOT (control group)	SCHOLAR PILOT	NFO (control group)	SCHOLAR NFO
10 YCS	45.90%	53.70%	43.81%	50%
11 YCS	32.85%	42.59%	35.70%	35%
12 YCS	25%	33.33%	30.01%	30%

Tables 8 and 9 display the retention rates to various career points (6 YCS to 9 YCS) of VGEP participants and non-participants by class year (N=191 participants and N=4,341 non-participants).

Table 8 shows the differences in VGEP retention to years of service six through nine by class year. Class years 1989, 1991, 1993, and 1996 were the only classes where

VGEP participant retention was higher across years of service six through nine. It is noteworthy that these years fall in the period (1987-2000) when the VGEP obligation was served consecutively. All other classes had varying retention rates to YCS 6-9 between participants and non-participants. Some years had higher retention for VGEP participants and some years the retention was lower for participants.

Table 8 VGEP Participant and Non-Participant Retention Rates (6-9 YCS) by Class Year

	6 YCS		7 YCS		8 YCS		9 YCS	
	VGEP (%)	NON-VGEP (%)	VGEP (%)	NON-VGEP (%)	VGEP (%)	NON-VGEP (%)	VGEP (%)	NON-VGEP (%)
1983	67	81	67	77	50	70	33	59
1984	67	80	50	73	67	62	67	50
1985	64	78	72	69	50	59	50	47
1986	78	71	78	65	67	57	33	39
1987	78	74	42	71	44	58	33	47
1988	67	72	100	66	33	57	33	49
1989	100	71	100	64	77	50	62	42
1990	82	73	82	68	55	60	55	51
1991	94	81	94	73	88	63	75	57
1992	91	80	91	73	64	69	64	61
1993	93	75	79	68	64	58	64	53
1994	100	71	100	66	56	57	56	51
1995	93	84	80	78	60	70	53	63
1996	100	88	92	86	92	79	92	68
1997	100	88	90	82	60	74	N/A	
1998	92	88	83	79	N/A		N/A	

Table 9 shows VGEP retention by graduating class to then through twelve years of service. Class years 1984, 1985, 1989, 1991, 1992, and 1993 were the only classes where VGEP participant retention was higher across years of service ten through twelve. All other classes had varying retention rates between participants and non-participants between years ten and twelve. Some years had higher retention for VGEP participants and some years the retention was lower for participants.

Table 9 VGEP Participant and Non-Participant Retention Rates (10-12 YCS) by Class Year

	10 YCS		11 YCS		12 YCS	
	VGEP (%)	NON-VGEP (%)	VGEP (%)	NON-VGEP (%)	VGEP (%)	NON-VGEP (%)
1983	17	53	17	50	17	46
1984	56	45	56	43	44	40
1985	43	42	43	40	43	38
1986	28	37	22	36	17	30
1987	33	43	22	39	11	32
1988	33	43	33	39	33	35
1989	62	37	62	34	54	32
1990	45	46	36	38	36	31
1991	69	48	50	43	50	41
1992	55	51	45	45	45	44
1993	64	47	64	43	57	41
1994	56	45	56	41	N/A	
1995	47	56	N/A		N/A	
1996	N/A		N/A		N/A	
1997	N/A		N/A		N/A	
1998	N/A		N/A		N/A	

Tables 10 and 11 display the retention of Scholarship participants and non-participants by class year and years of service (N=269 participants and N=5,477 non-participants).

Table 10 shows the differences in Scholarship retention by graduating class to years six through nine. Class years 1984, 1987, and 1990 were the only classes where Scholarship participant retention was higher across years of service six through nine. These years are included in the period (1983-1989) when the Scholarship obligation was served consecutively.

Table 10 Scholarship Participant and Non-Participant Retention Rates (6-9 YCS) by Class Year

	6 YCS		7 YCS		8 YCS		9 YCS	
	SCH (%)	NON-SCH (%)	SCH (%)	NON-SCH (%)	SCH (%)	NON-SCH (%)	SCH (%)	NON-SCH (%)
1983	100	81	100	75	89	67	56	58
1984	100	79	100	73	100	60	67	50
1985	100	77	89	68	89	58	44	47
1986	90	72	90	66	90	57	40	42
1987	91	74	91	70	82	57	64	46

1988	100	72	64	66	55	57	27	50
1989	78	72	78	65	44	53	44	45
1990	100	71	100	66	92	58	54	51
1991	92	80	92	72	92	61	77	56
1992	89	80	79	73	74	66	42	62
1993	87	76	74	68	61	58	52	54
1994	96	72	81	66	56	58	44	52
1995	85	85	81	77	77	70	54	64
1996	92	88	88	86	85	79	42	73
1997	100	88	92	82	79	73	N/A	
1998	92	88	84	78	N/A		N/A	

Table 11 shows Scholarship retention by graduating class to ten through twelve years of service. In class years 1984, 1985, 1987, 1989, 1990, 1991, and 1992, Scholarship retention was higher across years of service ten through twelve. All other classes had fluctuating retention rates for participants and non-participants between years ten through twelve.

Table 11 Scholarship Participant and Non-Participant Retention Rates (10-12 YCS) by Class Year

	10 YCS		11 YCS		12 YCS	
	SCH (%)	NON-SCH (%)	SCH (%)	NON-SCH (%)	SCH (%)	NON-SCH (%)
1983	44	52	44	50	44	46
1984	50	45	50	43	50	39
1985	44	42	44	41	44	38
1986	40	38	40	37	30	32
1987	64	42	55	38	55	32
1988	18	45	18	41	18	37
1989	44	39	44	35	44	32
1990	54	45	54	36	46	29
1991	69	47	54	41	54	37
1992	32	52	32	45	32	43
1993	48	49	45	44	45	42
1994	37	47	37	43	N/A	
1995	50	56	N/A		N/A	
1996	N/A		N/A		N/A	
1997	N/A		N/A		N/A	
1998	N/A		N/A		N/A	

F. METHODOLOGY AND MODELS

Binary logit models were used to estimate retention for the graduate education program participants. Separate models were estimated for each program type – VGEP and SCHOLARSHIP – and for each retention point – YCS 6 to YCS 12. As an example, one model estimated retention to YCS 7 (variable name = INATSEVEN). All models included a dummy variable for the type of graduate program – VGEP or SCHOLARSHIP. In addition, all models include the following control variables: FEMALE, BLACK, HISPANIC, ASIAN, OTHERMINORITY, MAJGRP1, MAJGRP2, MAJGRP3, PRIOR1, RECRATH, SWO, PILOT, NFO, SUB, SPECWAR, RLINE, YR83, YR84, YR85, YR86, YR87, YR88, YR89, YR90, YR91, YR92, YR93, YR94, YR95, YR96, YR97, and YR98 (for variable descriptions see Table 1).

These variables were included based on prior studies of officer retention, which indicate that race, sex, prior enlisted experience, community and major may affect retention decisions. These variables were also used because they were the most complete variables in the data set. The class year dummy variables were included in the model to capture changes in retention as the economy and obligation policies change over time.

Thus, the general logit retention model is as follows:

$$\begin{aligned} \text{RETENTION} = & \beta_0 + \beta_1 \text{VGEP} + \beta_2 \text{FEMALE} + \beta_3 \text{HISPANIC} + \beta_4 \text{ASIAN} \\ & + \beta_5 \text{OTHERMINORITY} + \beta_6 \text{MAJGRP2} + \beta_7 \text{MAJGRP3} + \beta_8 \text{PRIOR1} + \beta_9 \text{RECRATH} + \\ & \beta_{10} \text{SUB} + \beta_{11} \text{SPECWAR} + \beta_{12} \text{RLINE} + \beta_{13} \text{PILOT} + \beta_{14} \text{NFO} + \beta_{15} \text{YR84} + \beta_{16} \\ & \text{YR85} + \beta_{17} \text{YR86} + \beta_{18} \text{YR87} + \beta_{19} \text{YR88} + \beta_{20} \text{YR89} + \beta_{21} \text{YR90} + \beta_{22} \text{YR91} + \beta_{23} \text{YR92} \\ & + \beta_{24} \text{YR93} + \beta_{25} \text{YR94} + \beta_{26} \text{YR95} + \beta_{27} \text{YR96} + \beta_{28} \text{YR97} + \beta_{29} \text{YR98}. \end{aligned}$$

This basic retention model was estimated to retention points between 6 and 12 years of service to determine if retention rates. Although the control variables were the same in each model, the fiscal year dummy variables included in each model differed as some class years were excluded from each model.

In addition to estimating pooled models for all URL officers and for all aviators, separate models were estimated for each individual URL and Aviation community. A similar binary logit regression model was estimated for retention to years of service seven

through ten for SWO, SUB, and SPECWAR communities and to years of service ten through twelve for the PILOT and NFO communities. The models for the aviation communities only estimated retention models to 10, 11, and 12 years of service due to the longer MSR associated with those designators. The same set of logit models was estimated for the Scholarship program, with the exception that the VGEP variable was replaced by the SCHOLAR variable.

In order to complete this study, several assumptions were made. Retention was calculated between seven and twelve years of service. Seven years was used because it is two years after a program non-participant's MSR (excluding pilot and nfo). Seven years was also used because URL officers are usually at a point where they must decide whether to continue their career and become a department head or resign their commission. Although NFOs and pilots have longer minimum service requirements (between ten and twelve years), twelve years was the highest retention point analyzed because it is assumed that graduates who retain to the twelve-year mark will remain in the Navy through retirement due to the time they have already invested.

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IV. DATA ANALYSIS

This chapter presents the results of the regression analysis.

A. LOGIT MODELS OF RETENTION TO SIX YEAR OF SERVICE (6 YCS)

Tables 12 and 13 present the full results of the VGEP and Scholarship logit retention models for six years of service. The purpose of the analysis in this section is to compare the retention effects in the data in this study with the retention effects estimated by Milner (2003).

Table 12 VGEP 6 YCS Retention Model-Pooled URL Sample

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	1.939	<.0001	.000
VGEP	.6033	.0054	.053
FEMALE	-.3211	.0208	-.040
BLACK	.0573	.8651	.006
HISPANIC	.3161	.2475	.031
ASIAN	-.3821	.0877	-.049
OTHERMINORITY	-.3260	.2489	-.040
MAJGRP2	-.1567	.0819	-.018
MAJGRP3	-.2399	.0169	-.029
PRIOR1	.1260	.3906	.013
SUB	-.7575	<.0001	-.109
SPECWAR	-.4198	.0344	-.054
RLINE	-.8178	<.0001	-.120
YR84	-.0766	.7646	-.009
YR85	-.2636	.2289	-.032
YR86	-.5398	.0128	-.072
YR87	-.4404	.0425	-.057
YR88	-.5198	.0116	-.069
YR89	-.4192	.0432	-.054
YR90	-.4677	.0285	-.061
YR91	.0313	.8933	.003
YR92	-.1312	.5501	-.015
YR93	-.3821	.0639	-.048
YR94	-.5916	.0044	-.080
YR95	.1212	.5790	.013
YR96	.4201	.0720	.039
YR97	.4370	.0600	.041

YR98	.4540	.0503	.042
Log Likelihood Ratio = 233.67			
R-Squared = .0796			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 13 Scholarship 6 YCS Retention Model-Pooled URL Sample

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	1.999	<.0001	.000
SCHOLAR	1.3392	<.0001	.085
FEMALE	-.2724	.0271	-.032
BLACK	.0379	.8949	.004
HISPANIC	.2727	.2390	.026
ASIAN	-.3148	.1051	-.037
OTHERMINORITY	-.1086	.6624	-.012
MAJGRP2	-.0734	.3669	-.008
MAJGRP3	-.1496	.0913	-.017
PRIOR1	.1819	.1576	.018
SUB	-.8926	<.0001	-.129
SPECWAR	-.5875	.0008	-.077
RLINE	-.9438	<.0001	-.139
YR84	-.1350	.5005	-.015
YR85	-.2508	.1962	-.029
YR86	-.5318	.0055	-.068
YR87	-.4959	.0097	-.063
YR88	-.5588	.0027	-.072
YR89	-.4763	.0098	-.060
YR90	-.5975	.0015	-.078
YR91	-.1244	.5426	-.014
YR92	-.2408	.2105	-.028
YR93	-.4378	.0178	-.054
YR94	-.6727	.0004	-.090
YR95	.0614	.7575	.006
YR96	.3001	.1543	.028
YR97	.4023	.0573	.036
YR98	.3315	.1105	.031
Log Likelihood Ratio = 349.14			
R-Squared = .0936			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

For the VGEP pooled sample, compared to Surface Warfare Officers, retention was lower for: Submarine Officers (10.9 points), Special Warfare Officers (5.4 points), and Restricted Line Officers (12 points). Members of the Classes of 1986-1990 and 1994 were more likely to leave the service by their sixth year of service than the base case class (1983). However, members of the Classes of 1996-1998 were more likely to remain to their sixth year of service. Compared to graduates with a Group 1 major, graduates with Group 2 or 3 majors (1.8 points and 2.9 points, respectively) were less likely to remain on active duty to six years of service. Compared to Caucasians, Asian officers were 4.8 points less likely to be on active duty to six years of service. Females were 4 points more likely to leave by their sixth year of service compared to male officers.

Milner (2003) found that VGEP students had a 26.2 points higher retention rate than other students. By contrast, the marginal effect in our study indicates that VGEP students were only 5.3 points more likely to complete six years of service than non-participants, an 80 percent difference. The differences in results are likely to be due to modeling and data differences. This study controlled for fiscal year, which controls for changes in obligation policy and for changes in the economy over time. Milner did not attempt to account for changes in obligation policies or the civilian labor market over time.

For the Scholarship pooled sample, the retention was lower for: Submarine Officers (12.9 points), Special Warfare Officers (7.7 points), and Restricted Line Officers (13.9 points). Members of the Classes of 1986-1990, 1993 and 1994 were more likely to leave the service by their sixth year of service than the base case class (1983). However, members of the Classes of 1997 were more likely to remain to their sixth year of service. Compared to graduates with Group 1 major, graduates with a Group 3 majors were 1.7 points less likely to remain on active duty to six years of service. Females were 3.2 points more likely to leave then Navy by their sixth year of service compared to male officers.

Milner (2003) found that Scholarship students had a 26.1 points higher retention rate than other students. By contrast, the marginal effect in our study indicates that Scholarship students were only 8.5 points more likely to complete six years of service than non-participants, a 67 percent difference. Again, the differences in results are likely

to be due to modeling and data differences as this study controlled for fiscal year, which controls for changes in obligation policy.

Other noteworthy differences between Milners' study and this study were the signs of the coefficient for submarine officers and females. Milner concluded that females and submarine officers retain at a higher rate at 6 YCS (5.7 points and 3.3 points, respectively). His results are not consistent with the retention of experience of female junior officers, whose retention has consistently lagged that of males. By contrast, this study indicates that females and submarine officers were less likely to complete six years of service.

B. VOLUNTARY GRADUATE EDUCATION PROGRAM RESULTS

1. Logit Results: VGEP URL Pooled Sample

Tables 14-19 show the results of the VGEP model estimated using the pooled URL sample for various retention points. The samples contain all URL officers with the exception of pilots and NFO's who have a much longer service requirement than other URL officers (they are analyzed in separate 10-12 YCS VGEP pooled retention models). The models predict the probability of staying to each year of service from 7 YCS to 12 YCS. The tables present the estimated coefficients, significance levels and the calculated partial effects of the variables.

Table 14 presents the results of estimating the 7 YCS retention model. For the VGEP pooled sample, compared to Surface Warfare Officers, the following officers were less likely to stay at 7 YCS: Submarine Officers (12 points), Special Warfare Officers (8.9 points), and Restricted Line Officers (13.4 points). Members of the Classes of 1985, 1986, 1987, 1988, 1989, 1993, and 1994 were more likely to leave the service before seven years of service than the base case class (1983). Females were 7.6 points less likely to remain to their seventh year of service than males. Compared to Group 1 majors, graduates with Group majors 3 were less likely (by 4.9 points) to remain on active duty through their seventh year of service. The marginal effect of VGEP participants indicates that they are more likely to complete seven years of service (by 5.3 points or 6.3 percent) than non-participants during this period.

Table 14 VGEP 7 YCS Retention Model- Pooled URL Sample

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	1.690	<.0001	.000
VGEP	.4780	.0106	.053
FEMALE	-0.4966	<.0001	-.076
BLACK	.2312	.4706	.028
HISPANIC	.1700	.4668	.021
ASIAN	-.2172	.3093	-.030
OTHEMINORITY	-.1740	.5198	-.024
MAJGRP2	-.1337	.1083	-.018
MAJGRP3	-0.3365	.0002	-.049
PRIOR1	.0708	.5926	.009
RECRATH	.1151	.2371	.014
SUB	-.7280	<.0001	-.120
SPECWAR	-.5645	.0015	-.089
RLINE	-.7958	<.0001	-.134
YR84	-.2110	.3109	-.029
YR85	-.4877	.0156	-.075
YR86	-.5788	.0046	-.091
YR87	-.3449	.0940	-.050
YR88	-.5696	.0033	-.090
YR89	-.4812	.0135	-.074
YR90	-.4512	.0250	-.068
YR91	-.1134	.5942	-.015
YR92	-.2570	.2034	-.036
YR93	-.4722	.0141	-.072
YR94	-.5677	.0037	-.089
YR95	-.0685	.7286	-.009
YR96	.4929	.0231	.054
YR97	.2451	.2358	.029
YR98	.0585	.7708	.007
Log Likelihood Ratio= 248.54			
R- Squared=.0787			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 15 displays the results of the 8 YCS retention model. The results for 8 YCS in Table 15 were similar to those at 7 YCS. However, there were a few differences. Submarine Warfare Officers were far less likely to remain to 8 YCS. Their retention was

21.3 points lower than SWO's, almost double the retention effect at estimated at 7 YCS. Also, female graduates' probability to remain in the Navy to 8 YCS was lower than at 7 YCS. This is reasonable because this is a cohort analysis and continuation rates for the new entrants to each successive YCS continue to decline. Graduates with a Group 3 major continued to be less likely to retain through 8 YCS. At YCS 8 VGEP coefficient was not statistically significant indicating that there was no difference between VGEP participant retention to 8 YCS and non-participant retention. It would seem that as the obligation for VGEP ends, the retention of VGEP students is the same as for other USNA graduates with comparable AQPR's.

Table 15 VGEP 8 YCS Retention Model- Pooled URL Sample

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	1.447	<.0001	.000
VGEP	.1428	.3935	.021
FEMALE	-.6060	<.0001	-.110
BLACK	.0143	.9623	.002
HISPANIC	-.1463	.5057	-.023
ASIAN	-.0107	.9612	-.001
OTHEMINORITY	-.3222	.2210	-.054
MAJGRP2	-.0837	.3019	-.013
MAJGRP3	-.3686	<.0001	-.063
PRIOR1	.1183	.3566	.017
RECRATH	.1446	.1277	.021
SUB	-1.0592	<.0001	-.213
SPECWAR	-.7616	<.0001	-.144
RLINE	-.7010	<.0001	-.131
YR84	-.3229	.0954	-.054
YR85	-.5283	.0056	-.094
YR86	-.5681	.0034	-.102
YR87	-.5977	.0018	-.109
YR88	-.6191	.0007	-.113
YR89	-.7034	.0001	-.131
YR90	-.4634	.0148	-.081
YR91	-.2559	.1925	-.042
YR92	-.1810	.3426	-.029
YR93	-.6234	.0006	-.114
YR94	-.6398	.0005	-.118

YR95	-.1443	.4297	-.023
YR96	.3184	.1001	.044
YR97	.0814	.6640	.012
YR98	N/A	N/A	N/A
Log Likelihood Ratio=345.64			
R Squared = .1097			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 16 displays the results of the 9 YCS retention model. The results for 9 YCS in Table 16 were similar to those at 8 YCS. However, there were a few differences. Submarine Warfare Officers were 27.6 points less likely to remain to 9 YCS, more than double the retention difference at 7 YCS. Also, female graduates' likelihood to remain in the Navy to 9 YCS continued to fall. The coefficient for Hispanic was significant indicating Hispanic graduates were 8.7 points less likely to retain to 9 YCS. Prior enlisted graduates were 4.7 points more likely to remain to 9 YCS. The significance of the VGEP coefficient remained the same; it was not significant indicating that there was no difference between VGEP participant retention to 9 YCS and non-participant retention.

Table 16 VGEP 9 YCS Retention Model- Pooled URL Sample

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	.9520	<.0001	.000
VGEP	.2690	.1111	.050
FEMALE	-.6171	<.0001	-.138
BLACK	.1811	.5663	.034
HISPANIC	-.4039	.0759	-.087
ASIAN	-.2727	.2276	-.057
OTHERMINORITY	.0786	.7807	.015
MAJGRP2	-.0418	.6105	-.008
MAJGRP3	-.3724	<.0001	-.080
PRIOR1	.2533	.0550	.047
RECRATH	.0959	.3170	.018
SUB	-1.1729	<.0001	-.276
SPECWAR	-.5662	.0015	-.126
RLINE	-.5371	<.0001	-.119
YR84	-.3002	.1075	-.064
YR85	-.5128	.0056	-.113

YR86	- .8950	<.0001	- .207
YR87	- .5812	.0018	- .129
YR88	- .4641	.0092	- .101
YR89	- .5550	.0020	- .123
YR90	- .3418	.0632	- .073
YR91	- .0797	.6723	- .016
YR92	- .0199	.9130	- .004
YR93	- .3277	.0611	- .070
YR94	- .4494	.0123	- .098
YR95	.0209	.9043	.004
YR96	.2433	.1709	.046
YR97	N/A	N/A	N/A
YR98	N/A	N/A	N/A
Log Likelihood Ratio = 354.19			
R-Squared = .1190			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 17 displays the results of the 10 YCS retention model. The results for 10 YCS were similar to those at 9 YCS. Submarine Warfare Officers, females, Hispanics and graduates with a degree in major Group 3 were less likely to remain to 10 YCS. Also, the significance of the VGEP coefficient remained the same; it was not significant indicating that there was no difference between VGEP participant retention to 10 YCS and non-participant retention.

Table 17 VGEP 10 YCS Retention Model-Pooled URL Sample

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	.5492	<.0001	.000
VGEP	.2273	.1837	.051
FEMALE	- .5386	.0003	- .131
BLACK	.2148	.5018	.048
HISPANIC	- .5614	.0252	- .137
ASIAN	- .2360	.3157	- .0562
OTHERMINORITY	.0824	.7762	.019
MAJGRP2	- .1001	.2316	- .235
MAJGRP3	- .3889	<.0001	- .094
PRIOR1	.2873	.0335	.064
SUB	- .8603	<.0001	- .211

SPECWAR	- .3935	.0348	- .095
RLINE	- .2240	.0787	- .053
YR84	- .2564	.1612	- .061
YR85	- .4448	.0147	- .108
YR86	- .7181	.0001	- .176
YR87	- .4067	.0263	- .098
YR88	- .3950	.0242	- .095
YR89	- .5331	.0027	- .130
YR90	- .3101	.0860	- .074
YR91	- .1300	.4791	- .031
YR92	- .1295	.4628	- .031
YR93	- .3062	.0742	- .074
YR94	- .3851	.0292	- .093
YR95	.0438	.7949	.010
YR96	N/A	N/A	N/A
YR97	N/A	N/A	N/A
YR98	N/A	N/A	N/A
Log Likelihood Ratio = 181.16			
R-Squared = .0682			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 18 displays the results of the 11 YCS retention model. The results for 11 YCS were similar to those at 10 YCS. Submarine Warfare Officers, females, Hispanics and graduates with a Group 3 major were less likely to remain to 11 YCS. Also, the significance of the VGEP coefficient remained the same; it was not significant indicating that there was no difference between VGEP participant retention to 11 YCS and non-participant retention.

Table 18 VGEP 11 YCS Retention Model-Pooled URL Sample

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	.2918	.0326	.000
VGEP	.2369	.1883	.057
FEMALE	- .5045	.0020	- .125
BLACK	.0601	.8667	.015
HISPANIC	- .6123	.0408	- .152
ASIAN	.0147	.9536	.004
OTHERMINORITY	.3091	.3203	.073
MAJGRP2	- .1023	.2440	- .025

MAJGRP3	- .4136	<.0001	- .103
PRIOR1	.2673	.0607	.064
SUB	- .6369	<.0001	- .158
SPECWAR	- .1470	.4609	- .036
RLINE	- .0299	.8246	- .007
YR84	- .2112	.2456	- .052
YR85	- .3886	.0323	- .097
YR86	- .6307	.0008	- .156
YR87	- .4459	.0150	- .111
YR88	- .4378	.0125	- .109
YR89	- .5172	.0037	- .129
YR90	- .5005	.0060	- .124
YR91	- .2403	.1897	- .060
YR92	- .2336	.1835	- .058
YR93	- .3126	.0676	- .078
YR94	- .4038	.0223	- .100
YR95	N/A	N/A	N/A
YR96	N/A	N/A	N/A
YR97	N/A	N/A	N/A
YR98	N/A	N/A	N/A
Log Likelihood Ratio =101.88			
R-Squared = .0434			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 19 displays the results of the 12 YCS retention model. The results for 12 YCS were similar to those at 11 YCS. Submarine Warfare Officers, females, Hispanics and graduates with a Group 3 major were less likely to remain to 12 YCS. Also, the significance of the VGEP coefficient remained the same; it was not significant indicating that there was no difference between VGEP participant retention to 12 YCS and non-participant retention.

Table 19 VGEP 12 YCS Retention Model-Pooled URL Sample

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	.0423	.7591	.000
VGEP	.1950	.3046	.048
FEMALE	- .6913	.0002	- .167
BLACK	.1965	.6587	.049
HISPANIC	- .6726	.0445	- .163

ASIAN	.0703	.7866	.018
OTHERMINORITY	.4258	.2156	.104
MAJGRP2	-.0722	.4367	-.018
MAJGRP3	-.4509	<.0001	-.111
PRIOR1	.2841	.0662	.070
SUB	-.4591	<.0001	-.113
SPECWAR	-.1918	.4029	-.048
RLINE	.1792	.2176	.045
YR84	-.2152	.2397	-.054
YR85	-.3050	.0946	-.076
YR86	-.7310	.0002	-.176
YR87	-.6008	.0014	-.147
YR88	-.4063	.0218	-.100
YR89	-.4675	.0093	-.115
YR90	-.6348	.0007	-.155
YR91	-.1378	.4542	-.034
YR92	-.0769	.6624	-.019
YR93	-.2104	.2207	-.052
YR94	N/A	N/A	N/A
YR95	N/A	N/A	N/A
YR96	N/A	N/A	N/A
YR97	N/A	N/A	N/A
YR98	N/A	N/A	N/A
Log Likelihood Ratio = 96.68			
R-Squared = .0457			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

The results of the pooled URL VGEP model show that VGEP retention is higher to 7 YCS. After the 7 year mark, VGEP participants retain at the same rate as non-participants. The results also show that Submarine Warfare Officers retain at a lower rate than Surface Warfare Officers. It is not surprising that female graduates retain at a lower rate than male graduates.

2. Logit Results: VGEP URL Pooled Sample (Pilots and NFOs included)

Tables 26-28, in Appendix A, show the results of the VGEP model of retention to 10-12 years of service. This model includes pilots and NFOs in the URL retention model. Pilots and NFOs were included in the VGEP URL Pooled model in order to compare

retention rates to 10-12 years of service. Pilots and NFOs were not included in 7-9 years of service due to their longer MSR. The tables present the estimated coefficients, significance level and the calculated partial effects of each variable.

Compared to Surface Warfare Officers, Pilots, NFOs, Special Warfare Officers and Restricted Line Officers were more likely to remain on active duty to 10 YCS than a SWO. However, Submarine Officers are 4.7 points less likely to remain on active duty than a SWO. Members of the Classes of 1985-1990, 1993 and 1994 were less likely to remain in the service for ten years of service than the base case class (1983). Female graduates were 11.1 points more likely to get out of the Navy than their male counterparts. Hispanic graduates were 13.7 points less likely to be in the Navy than their Caucasian classmates. Compared to graduates with a Group 1 major, graduates with a Group 3 major were 8.4 points less likely to remain on active duty through their tenth year of service. Prior enlisted graduates were 7.2 points more likely to remain on active duty to ten years of service. The coefficient of the VGEP was not significant indicating that there was no difference between VGEP participant retention and non-participant retention at 10 YCS.

The results for 11 YCS and 12 YCS were similar to those at 10 YCS. Pilots and NFOs who participated in VGEP were more likely to remain in the Navy to 10 YCS, but there was no difference between participant and non-participant retention beyond 10 YCS. The higher retention for participants at 10 YCS can be attributed to the longer service obligation pilots and NFOs incur.

C. SCHOLARSHIP PROGRAM RESULTS

1. Logit Results: Scholarship URL Pooled Sample

Tables 20 through 25 show the results of the Scholarship retention model estimated using the URL sample. The samples do not contain pilots and NFO's because their MSR is longer than other URL officers (they are analyzed in separate 10-12 YCS Scholarship pooled retention models). The models predict the probability of staying to each year of service from 7 to 12. Each table presents the estimated coefficients, significance level and the calculated partial effects of each variable.

Table 20 displays the results of the 7 YCS retention model. For the Scholarship pooled sample in Table 20, retention was lower for Submarine Officers (14.4 points), Special Warfare Officers (11.4 points) and Restricted Line Officers (15 points). Members of the Classes of 1985 through 1994 were more likely to remain in the Navy to seven years of service than the base case class (1983). However, members of the Classes 1996 and 1997 were more likely to remain in service. Compared to graduates with a Group 1 major, graduates with a Group 3 major were 3.7 points less likely to remain on active duty through their seventh year of service. Female graduates were 8 points less likely to remain in the service through their seventh year of service compared to male graduates. Prior enlisted graduates were 2.3 points more likely to remain on active duty through seven years of service compared to non-prior enlisted graduates. The marginal effect of Scholarship participants was positive and significant. The difference in the retention rate was 8.4 percentage points, or about 10 percent.

Table 20 Scholarship 7 YCS Retention Model-Pooled URL Sample

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	1.648	<.0001	.000
SCHOLAR	.8374	<.0001	.084
FEMALE	-.5056	<.0001	-.080
BLACK	.2321	.3899	.028
HISPANIC	.1228	.5340	.015
ASIAN	-.1764	.3375	-.025
OTHEREMINORITY	-.0443	.8474	-.006
MAJGRP2	-.0818	.2724	-.011
MAJGRP3	-.2552	.0014	-.037
PRIOR1	.1862	.1096	.023
RECRATH	.0223	.7880	.002
SUB	-.8280	<.0001	-.144
SPECWAR	-.6815	<.0001	-.114
RLINE	-.8546	<.0001	-.150
YR84	-.1432	.4337	-.020
YR85	-.3641	.0386	-.055
YR86	-.4500	.0114	-.070
YR87	-.3041	.0895	-.045
YR88	-.5074	.0032	-.080
YR89	-.4708	.0057	-.074

YR90	- .4562	.0093	- .071
YR91	- .1516	.4120	- .021
YR92	- .2614	.1337	- .038
YR93	- .4782	.0045	- .075
YR94	- .5653	.0012	- .091
YR95	- .0627	.7212	- .008
YR96	.4890	.0114	.055
YR97	.2480	.1747	.030
YR98	.0558	.7531	.007
Log Likelihood Ratio = 346.49			
R-Squared = .0861			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 21 displays the results of the 8 YCS retention model. The results for 8 YCS were similar to those at 7 YCS. However, there were a couple of differences. Submarine Warfare Officers were 24.2 points less likely to remain to 8 YCS. Also, female graduates' likelihood to remain in the Navy to 8 YCS was lower than at 7 YCS. The coefficient for Scholarship remained positive and significant indicating Scholarship participants were more likely to remain in the Navy to 8 YCS than non-participants. The difference in the retention rate was 9.9 percentage points, or about 12.5 percent.

Table 21 Scholarship 8 YCS Retention Model-Pooled URL Sample

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	1.365	<.0001	.000
SCHOLAR	.7905	<.0001	.099
FEMALE	-.5913	<.0001	-.112
BLACK	.00116	.9963	.000
HISPANIC	-.0829	.6595	-.013
ASIAN	-.1196	.5184	-.020
OTHERMINORITY	-.0853	.7002	-.014
MAJGRP2	-.0544	.4526	-.008
MAJGRP3	-.3048	<.0001	-.053
PRIOR1	.2082	.0608	.031
RECRATH	.0367	.6504	.005
SUB	-1.1472	<.0001	-.242
SPECWAR	-.7965	<.0001	-.158

RLINE	- .7261	<.0001	- .142
YR84	- .3190	.0597	- .056
YR85	- .4169	.0120	- .075
YR86	- .4165	.0137	- .075
YR87	.5065	.0024	- .094
YR88	- .5533	.0007	- .104
YR89	- .6064	.0002	- .115
YR90	- .4416	.0079	- .080
YR91	- .3168	.0641	- .056
YR92	- .2320	.1565	- .040
YR93	- .6055	.0001	- .115
YR94	- .6307	.0001	- .120
YR95	- .0988	.5438	- .016
YR96	.3597	.0371	.052
YR97	.0986	.5506	.015
YR98	N/A	N/A	N/A
Log Likelihood Ratio = 465.65			
R-Squared = .1158			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 22 displays the results of the 9 YCS retention model. The results for 9 YCS were similar to those at 8 YCS. However, there were a few differences. Submarine Warfare Officers were 28.3 points less likely to remain to 9 YCS. Also, female graduates' likelihood to remain in the Navy to 9 YCS was lower than at 8 YCS. Previous years showed no difference in the retention of Asian officer. At 9 YCS this changed indicating Asian officers were less likely to remain on active duty at 9 YCS. Perhaps the most important difference in the model is that the coefficient for Scholarship changed and was no longer significant, indicating there was no difference in Scholarship participant retention and non-participant retention. Thus, after the 8-year obligation for Scholarship recipients ended they were equally likely to leave as other USNA graduates with similar academic backgrounds.

Table 22 Scholarship 9 YCS Retention Model- Pooled URL Sample

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	.8918	<.0001	.000
SCHOLAR	-.0492	.7377	-.010
FEMALE	-.5936	<.0001	-.135
BLACK	.2688	.3064	.052
HISPANIC	-.2413	.2081	-.052
ASIAN	-.3429	.0727	-.075
OTHEMINORITY	.1162	.6177	.023
MAJGRP2	-.0192	.7923	-.003
MAJGRP3	-.2990	.0001	-.065
PRIOR1	.2839	.0118	.054
RECRATH	.0219	.7890	.004
SUB	-1.1914	<.0001	-.283
SPECWAR	-.6038	.0002	-.137
RLINE	-.5863	<.0001	-.133
YR84	-.2896	.0768	-.063
YR85	-.4493	.0053	-.100
YR86	-.6665	<.0001	-.153
YR87	-.5117	.0016	-.115
YR88	-.3959	.0124	-.087
YR89	-.4753	.0026	-.106
YR90	-.3114	.0531	-.068
YR91	-.0889	.5905	-.108
YR92	-.0131	.9335	-.002
YR93	-.2872	.0614	-.062
YR94	-.3850	.0158	-.085
YR95	.0923	.5519	.018
YR96	.3703	.0201	.070
YR97	N/A	N/A	N/A
YR98	N/A	N/A	N/A
Log Likelihood Ratio = 444.65			
R-Squared = .1172			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 23 displays the results of the 10 YCS retention model. The results for 10 YCS retention were similar to those of the 9 YCS retention model. Submarine Warfare Officers and females were less likely to remain to 10 YCS. The only difference between

the results for 9 and 10 YCS was the significance of a Group 3 major. Graduates with a Group 3 major were 8.4 points less likely to remain in the Navy to 10 YCS. Also, the coefficient for Scholarship was not significant, indicating there was no difference in Scholarship participant retention and non-participant retention at 10 YCS.

Table 23 Scholarship 10 YCS Retention Model-Pooled URL Sample

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	.5203	<.0001	.000
SCHOLAR	.0608	.6932	.014
FEMALE	-.5192	<.0001	-.127
BLACK	.3442	.1930	.076
HISPANIC	-.2534	.2109	-.061
ASIAN	-.2658	.1754	-.064
OTHERMINORITY	-.0142	.9524	-.003
MAJGRP2	-.0473	.5242	-.011
MAJGRP3	-.3484	<.0001	-.084
PRIOR1	.3209	.0051	.071
SUB	-.9072	<.0001	-.223
SPECWAR	-.3766	.0239	-.091
RLINE	-.2779	.0150	-.067
YR84	-.2622	.1030	.063
YR85	-.4061	.0105	-.099
YR86	-.5794	.0004	-.142
YR87	-.4092	.0104	-.099
YR88	-.3477	.0256	-.084
YR89	-.4941	.0016	-.121
YR90	-.3253	.0399	-.079
YR91	-.2086	.1967	-.049
YR92	-.1361	.3726	-.032
YR93	-.2638	.0800	-.063
YR94	-.3490	.0263	-.084
YR95	.0382	.7993	.009
YR96	N/A	N/A	N/A
YR97	N/A	N/A	N/A
YR98	N/A	N/A	N/A
Log Likelihood Ratio = 228.64			
R-Squared = .0671			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 24 displays the results of the 11 YCS retention model. The results for retention to 11 YCS were similar to those at 10 YCS. Submarine Warfare Officers and females were less likely to remain to 11 YCS. Also, officer with prior enlisted experience were 8.2 points more likely to remain in the Navy. The coefficient for Scholarship remained insignificant, indicating there was no difference in retention for Scholarship participants and other USNA graduates at 11 YCS.

Table 24 Scholarship 11 YCS Retention Model-Pooled URL Sample

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	.2892	.0155	.000
SCHOLAR	.1538	.3514	.037
FEMALE	-.4751	.0008	-.118
BLACK	.0870	.7639	.021
HISPANIC	-.3323	.1547	-.083
ASIAN	-.0942	.6540	-.023
OTHERMINORITY	.2073	.4118	.050
MAJGRP2	-.0543	.4840	-.013
MAJGRP3	-.3489	<.0001	-.087
PRIOR1	.3448	.0043	.082
SUB	-.6920	<.0001	-.171
SPECWAR	-.0833	.6380	-.021
RLINE	-.0877	.4678	-.022
YR84	-.2394	.1342	-.059
YR85	-.3541	.0248	-.088
YR86	-.5016	.0020	-.125
YR87	-.4493	.0049	-.111
YR88	-.4105	.0084	-.102
YR89	-.5312	.0007	-.132
YR90	-.5700	.0004	-.142
YR91	-.3422	.0343	-.085
YR92	-.3025	.0469	-.075
YR93	-.3147	.0361	-.078
YR94	-.3592	.0221	-.089
YR95	N/A	N/A	N/A
YR96	N/A	N/A	N/A
YR97	N/A	N/A	N/A
YR98	N/A	N/A	N/A

Log Likelihood Ratio = 134.04
R-Squared = .0435

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 25 displays the results of the 12 YCS retention model. The results for 12 YCS were similar to those at 11 YCS. Submarine Warfare Officers and females were less likely to remain to 12 YCS. The coefficient for Scholarship remained insignificant, indicating there was no difference in retention between Scholarship participants and other USNA graduates at 11 YCS.

Table 25 Scholarship 12 YCS Retention Model-Pooled URL Sample

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	.0436	.7181	.000
SCHOLAR	.2718	.1307	.067
FEMALE	-.6044	.0001	-.178
BLACK	.2759	.4211	.068
HISPANIC	-.3707	.1513	-.092
ASIAN	-.0170	.9374	-.004
OTHERMINORITY	.1704	.5360	.042
MAJGRP2	-.0057	.9437	-.001
MAJGRP3	-.3503	.0002	-.087
PRIOR1	.3380	.0090	.083
SUB	-.5237	<.0001	-.129
SPECWAR	-.0695	.7271	-.017
RLINE	.1111	.3912	.028
YR84	-.2327	.1474	-.058
YR85	-.3225	.0421	-.080
YR86	-.5844	.0004	-.143
YR87	-.5566	.0006	-.136
YR88	-.4127	.0087	-.102
YR89	-.5132	.0012	-.126
YR90	-.6995	<.0001	-.169
YR91	-.3092	.0578	-.077
YR92	-.1714	.2609	-.043
YR93	-.2540	.0923	-.063
YR94	N/A	N/A	N/A
YR95	N/A	N/A	N/A
YR96	N/A	N/A	N/A

YR97	N/A	N/A	N/A
YR98	N/A	N/A	N/A
Log Likelihood Ratio = 112.65			
R-Squared = .0411			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

The results of the pooled URL Scholarship model show that Scholarship retention was higher to 7 and 8 YCS. After the 8 year mark, Scholarship participants retained at the same rate as non-participants. The results also show that Submarine Warfare Officers retained at a lower rate than Surface Warfare Officers. This is not surprising since Submarine Warfare Officers receive more technical training making them marketable in the civilian sector.

2. Logit Results: Scholarship URL Pooled Sample (Pilots and NFOs included)

Tables 29-31, in Appendix B, show the results of the Scholarship model of retention to 10-12 years of service that contains all officers including pilots and NFO's. Pilots and NFOs were included in the Scholarship URL Pooled model in order to compare retention rates to 10-12 years of service. Pilots and NFOs were not included in 7-9 years of service due to their longer MSR. Compared to Surface Warfare Officers, Pilots (25.5 points), NFOs (18.3 points), Special Warfare Officers (6.4 points) and Restricted Line Officers (8 points) were more likely to remain on active duty to 10 YCS. Submarine Officers were 6.8 points less likely to be in the Navy after ten years of service. Members of the Classes of 1984-1991, 1993 and 1994 were less likely to remain in the Navy to year ten of service than the base case class (1983). Black graduates were 9.2 points more likely to remain on active duty compared to their Caucasian counterparts. Compared to graduates with Group 1 majors, Group 3 majors were 7.6 points less likely to remain on active duty through their tenth year of service. Female graduates were 10.6 points less likely to remain in the service through their tenth year of service compared to a male officer. Prior enlisted graduates were 8.5 points more likely to remain on active duty through ten years of service compared to non-prior enlisted graduates. The coefficient for Scholarship was not significant indicating that there was no difference between Scholarship participant retention and non-participant retention at 10 YCS. The

results for 11 YCS and 12 YCS were similar to those at 10 YCS. There were no differences between participant and non-participant retention.

D. VGEP LOGIT RESULTS – INDIVIDUAL COMMUNITY MODELS

1. Logit Results: Surface Warfare Officers

Tables 32-35, in Appendix C, present the full results of the SWO retention model for 7-10 years of service. We briefly discuss the results here. The results of the VGEP Surface Warfare Officer retention model showed that there was not much difference between SWO's who participated in VGEP and those who were non-participants. Most of the coefficients for the variables were not significant. Surface Warfare Officers who participated in VGEP were more likely to remain in the Navy to 7 YCS. However, the coefficient for VGEP was not significant at 8-10 YCS, indicating that there was no difference between VGEP participant retention and non-participant retention after 7 YCS.

2. Logit Results: Submarine Warfare Officers

Tables 36-39, in Appendix C, present the full results of the Submarine Warfare Officers retention model for 7-10 years of service. Females were removed from the model because submarine duty is restricted to males. The results of the VGEP Submarine Warfare Officer retention model showed that there were some differences between Submarine Warfare Officers who participated in VGEP and non-participants. Hispanic submarine officers were less likely to remain on active duty between 8 and 10 YCS, similar to the pooled VGEP retention model. Also, officers with prior enlisted experience retained at a higher rate in the Submarine community. Another difference between the Submarine Officer retention model and the pooled VGEP retention model was the retention of Asian officers. At 9 and 10 YCS, Asian officers were less likely (28.5 points and 32.4 points, respectively) to remain in the Navy or Submarine community. The coefficient for VGEP was only positive and significant at 7 and 9 YCS, indicating retention was higher for VGEP Submarine Warfare Officer participants to those decision points. The coefficient was not significant at 8 and 10 YCS, indicating there was no difference between VGEP participant retention and non-participant retention for those years of service.

3. Logit Results: Special Warfare Officers (7-10 YCS)

Tables 40-43, in Appendix C, present the full results of the Special Warfare Officers retention model for 7-10 years of service. The original model failed to converge due to the small number of graduate education participants, so all variables were deleted except for VGEP, degree major and prior enlisted experience. Special Warfare Officers with a Group 3 major were more likely to separate compared to those with a Group 1 major. These results are similar to the pooled VGEP retention model. The coefficient for VGEP was not significant in the Special Warfare Officer model, indicating there was no difference between VGEP participant retention and non-participant retention.

4. Logit Results: Pilots

Tables 44-46, in Appendix C, present the full results of the Pilot retention model for 10-12 years of service. The results of the VGEP Pilot retention model showed that there were some differences between Pilots who participated in VGEP and those who were non-participants. Hispanic pilots were less likely to remain on active duty between 10 and 12 YCS, similar to the pooled VGEP retention model. Also, pilots with prior enlisted experience retained at a higher rate. At 10 and 12 YCS, females were less likely to remain in the Navy, similar to the pooled VGEP retention model. Another difference between the Pilot retention model and the pooled VGEP retention model was the retention of graduates with a Group 2 major. The coefficient for Group 2 major was not significant in the pooled VGEP retention model, indicating there were no differences in the retention of graduates with Group 2 majors and those with Groups 1 and 3 majors. The Pilot retention model shows that pilots with a degree in major Group 2 were less likely to remain on active duty through 12 YCS. The coefficient for VGEP was only positive and significant at 10 and 11 YCS, indicating retention was higher for pilots who were VGEP participants to those points. The coefficient was not significant at 12 YCS, indicating there was no difference between VGEP participant retention and non-participant retention at 12 YCS.

5. Logit Results: Naval Flight Officers (10-12 YCS)

Tables 47-49, in Appendix C, present the full results of the Naval Flight Officer retention model for 10-12 years of service. The retention results for Naval Flight Officers

at ten through twelve years of service were similar. Naval Flight Officers with Groups 2 and 3 majors were less likely to remain on active duty between ten and twelve years of service. Naval Flight Officers with prior enlisted time were more likely to remain on active duty than NFOs with no prior enlisted experience. These results were similar to those in the pooled VGEP retention model. The coefficient for VGEP was not significant indicating there was no difference between VGEP participant retention and non-participant retention.

E. SCHOLARSHIP LOGIT RESULTS-INDIVIDUAL COMMUNITIES

1. Logit Results: Surface Warfare Officers

Tables 50-53, in Appendix D, present the full results of the SWO retention model for 7-10 years of service. The results of the Scholarship SWO retention model showed that there was not much difference between SWO's who participated in Scholarship and those who were non-participants. Most of the coefficients for the variables were not significant. However, the coefficient for black officers was both positive and significant for 7-10 YCS. Black officer retention was between 15 and 27 points for 7-10 YCS. This was different than the pooled Scholarship model where the coefficient was not significant. Surface Warfare Officers who participated in the Scholarship program were more likely to remain in the Navy to 8 YCS. However, the coefficient for Scholarship was not significant at 9 and 10 YCS.

2. Logit Results: Submarine Warfare Officers

Tables 54-57, in Appendix D, present the full results of the Submarine Warfare Officer retention model for 7-10 years of service. Females were removed from the model because submarine duty is restricted to males. The results of the Scholarship Submarine Warfare Officer retention model showed that there were some differences between Submarine Warfare Officers who participated in Scholarship and those who were non-participants. Hispanic Submarine Officers were less likely to remain on active duty to 8, 9, and 10 YCS, which is different compared to the pooled Scholarship retention model. Also, officers with prior enlisted experience retained at a higher rate in the Submarine community. Another difference between the Submarine Officer retention model and the

pooled VGEP retention model was the retention of Asian officers. At 9 and 10 YCS, Asian officers were less likely (24.6 points and 31.3 points, respectively) to remain in the Navy or Submarine community. The coefficient for Scholarship was only positive and significant at 7 and 8 YCS, indicating retention was higher for Scholarship Submarine Warfare Officer participants. The coefficient was not significant at 9 and 10 YCS.

3. Logit Results: Special Warfare Officers

Tables 58-61, in Appendix D, present the full results of the Special Warfare Officers retention model for 7-10 years of service. The original model failed to converge so all variables were deleted except for Scholarship, degree major and prior enlisted experience. Special Warfare Officers with a Group 3 major was more likely to separate compared to those with a Group 1 major at 7, 8, and 9 YCS. The coefficient for Scholarship was not significant in the Special Warfare Officer model in years seven through ten, indicating there was no difference between Scholarship participant retention and non-participant retention.

4. Logit Results: Pilots

Tables 62-64, in Appendix D, present the full results of the Pilot retention model for 10-12 years of service. The results of the Scholarship pilot retention model showed that there were some differences between pilots who participated in Scholarship and those who were non-participants. Hispanic pilots were less likely to remain on active duty between 11 and 12 YCS, which is different compared to pooled Scholarship retention model. Also, pilots with prior enlisted experience retained at a higher rate. At 10, 11, and 12 YCS, females were less likely to remain in the Navy, similar to the pooled Scholarship retention model. Another difference between the Pilot retention model and the pooled Scholarship retention model was the retention of graduates with a Group 2 major. The coefficient for Group 2 major was not significant in the pooled Scholarship retention model, indicating there were no differences in the retention of graduates with Group 2 majors and those with Groups 1 and 3 majors. The Pilot retention model shows that pilots with a degree in major Group 2 were less likely to remain on active duty through 12 YCS. The coefficient for Scholarship was only positive and significant at 10, 11, and 12 YCS, indicating retention was higher for pilots who were Scholarship participants.

5. Logit Results: Naval Flight Officers

Tables 65-67, in Appendix D, present the full results of the Naval Flight Officer retention model for 10-12 years of service. The retention results for Naval Flight Officers at 10-12 YCS were similar. Naval Flight Officers with Group 2 and 3 degrees were less likely to remain on active duty. The coefficient for Scholarship was not significant indicating there was no difference between Scholarship participant retention and non-participant retention for 10-12 YCS.

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V. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

A. SUMMARY OF VGEP RESULTS

1. Results from Pooled Data

The results of the VGEP pooled URL model show that VGEP participants in the URL were more likely to remain on active duty between six and eight years of service than non-participants. However, for years nine through twelve the retention for VGEP participants and non-participants were similar. Compared to males in the pooled sample, female retention was found to be negative for each retention year analyzed. Technical Group 1 majors were more likely to remain on active duty than non-technical Group 3 majors.

2. Results from Community-Specific Models

The results from the community-specific models indicated that Surface Warfare Officers who participated in VGEP were more likely to remain on active duty through nine years of service than those who did not participate in VGEP. However, VGEP was not significant at ten years of service indicating there was no difference in retention between SWO VGEP participants and non-participants at that retention point.

Submarine Warfare Officers who participated in VGEP were more likely to remain on active duty at seven and nine years of service. VGEP was not significant at eight and ten years of service indicating that there was no difference in retention between Submarine Officer VGEP participants and non-participants. Due to the high training cost of Submariners, a high retention rate of program participants is desirable to the Navy. Higher retention of these officers would mean higher savings to the Navy.

The retention of junior Special Warfare Officers has been an issue. Davids (1998) found that Special Warfare Officers resigned at a high rate due to job dissatisfaction. This dissatisfaction was a result of extended family separations, minimal chances for conducting combat operations and lack of vision from senior officers in their community.

Special Warfare Officers who participated in VGEP did not retain at a higher rate than non-participants. Essentially there was no difference in the retention of participants

and non-participants. To increase the retention of Special Warfare Officers, job satisfaction needs to be top priority, regardless of graduate education participation.

Pilots who participated in VGEP were more likely to remain on active duty to ten, eleven, and twelve years of service than non-participants. The higher retention can be attributed to the increased service obligation pilots incur due to participating in graduate education and the longer training pipeline. The higher retention can also be attributed to the length of time already served. Pilots who retain to twelve years of service are assumed to stay through to retirement.

Naval Flight Officers who participated in VGEP did not retain at a higher rate than non-participants. Essentially there was no difference in the retention of participants and non-participants. The longer service obligation incurred by NFO's did not cause a higher retention.

In summary, Unrestricted Line Officers who were VGEP participants retained at a higher rate to seven years of service. However, there was no difference in retention for participants and non-participants beyond seven years of service. This shows that VGEP only increases retention to seven years of service and does not influence officers to make a full 20-year career of the Navy.

Pilots who participated in VGEP have a higher retention rate than those who did not participate in VGEP. This increased retention can be attributed to the higher service obligation pilots incur due to their participation in VGEP and the longer training pipeline of pilots. Pilots who remain in the Navy through twelve years of service are assumed to make a career out of the Navy due to the time already spent in the military.

B. SUMMARY OF SCHOLARSHIP RESULTS

1. Results from Pooled Data

The results of the pooled Scholarship URL model show that Scholarship participants were more likely to remain on active duty between six and eight years of service than non-participants. However, for years nine through twelve the retention for Scholarship participants and non-participants were similar. Compared to males in the

pooled sample, female retention was found to be negative for each retention year analyzed. Technical Group 1 majors were more likely to remain on active duty than non-technical Group 3 majors. The slightly higher retention rate of Scholarship participants leads to the rejection of the null hypothesis. Scholarship participants do not leave the Navy at the same rate as Scholarship non-participants.

2. Results from Community-Specific Models

The results from the community-specific models indicate that Surface Warfare Officers who participated in Scholarship were more likely to remain on active duty through eight years of service than those who did not participate in Scholarship. Scholarship was not significant at nine or ten years of service indicating there was no difference in retention between SWO Scholarship participants and non-participants at nine and ten years of service.

Submarine Warfare Officers who participated in Scholarship were more likely to remain on active duty at seven and eight years of service. Scholarship was not significant at nine and ten years of service indicating that there was no difference in retention between Submarine Officer Scholarship participants and non-participants. Due to the high training cost of Submariners, a high retention rate of program participants is desirable to the Navy. Higher retention of these officers would mean higher savings to the Navy.

Special Warfare Officers who participated in Scholarship did not retain at a higher rate than non-participants. Essentially there was no difference in the retention of participants and non-participants. To increase the retention of Special Warfare Officers, job satisfaction needs to be top priority, regardless of graduate education participation.

Pilots who participated in Scholarship were more likely to remain on active duty between ten and twelve years of service than non-participants. The higher retention can be attributed to the increased service obligation pilots incur due to participating in graduate education and the longer training pipeline. The higher retention can also be attributed to the length of time already served. Pilots who retain to twelve years of service are assumed to stay through to retirement.

Naval Flight Officers who participated in Scholarship did not retain at a higher rate than non-participants. Essentially there was no difference in the retention of participants and non-participants. The longer service obligation incurred by NFO's did not cause a higher retention.

In summary, Unrestricted Line Officers who were Scholarship participants retained at a higher rate to years seven and eight. However, there was no difference in retention for participants and non-participants at and beyond nine years of service. This shows that Scholarship only increases retention to eight years of service and does not influence officers to make a full 20-year career of the Navy.

As stated previously, pilots who participated in the Scholarship program have higher retention rates than those who did not participate in the Scholarship program. This increased retention can be attributed to the higher service obligation pilots incur due to their participation in the Scholarship program and the longer training pipeline pilots go through. Pilots who remain in the Navy through twelve years of service are assumed to make a career out of the Navy due to the time already spent in the military.

C. FURTHER RESEARCH

There are several areas where further research would benefit the study of immediate graduate education. To determine if the retention effects associated with immediate graduate education are similar for different commissioning sources, a similar study should be conducted on Naval Reserve Officer Training Corps (NROTC) Scholarship participants and NROTC Leave of Absence (LOA) participants.

A Return on Investment (ROI) analysis should also be conducted to determine if the retention differences associated with the immediate graduate education programs are worth the cost. This ROI analysis should be conducted for both NROTC and USNA students.

The retention effects also should be computed for 'normal' graduate education programs funded by the Navy to determine how the retention of students in graduate education programs received later in an officer's career (i.e., normally as a Lieutenant)

compares to the retention of students who receive immediate graduate education. The ROI on the normal graduate programs should be estimated and compared to the early education programs.

Also, once sufficient retention data is available for Immediate Graduate Education Program (IGEP) participants, a complete retention analysis and ROI study should be conducted. The recent inception of this program (1999) did not allow its inclusion in this study.

To correct for selection bias in all studies, a panel probit estimation could be utilized in the retention models. Also, to determine the probability of graduate education program participants remaining in the Navy through 20 years of service and the probability of promoting to O-4, a survival model could be conducted.

One significant limitation in this study was the lack of lateral transfer data. Without the data, it was assumed that the community chosen at graduation was the same community the graduate remained in until separation from the Navy. This could be a problem because lateral transfers can change an officer's service obligation.

D. RECOMMENDATIONS

Due to the need for further research on early graduate education, the Navy should not make any changes to the service obligations associated with the U.S. Naval Academy VGEP and Scholarship programs at this time. Further study and research on the ROI of these programs as compared to later graduate education ROI will determine whether future policy changes will be necessary.

E. CONCLUSIONS

The results suggest that early graduate education programs have a positive effect on retention of URL officer (non-aviators); however, the magnitudes are small. Among pilots, the program effect on retention is much larger, between 15-20 percentage points. Due to the positive retention results, it is recommended that the USNA Graduate Education Committee continue choosing program participants based mainly on an AQPR of 3.2. Also, the committee should limit the number of AQPR, conduct, and military

performance waivers to ensure that only the highest quality applicants are chosen for these programs. Lowering the standards set for program participation may have a negative effect on retention.

Also, the service obligation incurred by participating in the VGEP and Scholarship programs should be enforced. Allowing participants to leave the Navy before their service obligation has been completed does not benefit the Navy. The time and money the Navy invests into these individuals should be treated like a valuable investment. Exceptions releasing participants from the Navy prior to completion of their service obligation should only be made in dire circumstances.

APPENDIX A: VGEP RETENTION MODEL-POOLED URL SAMPLE (AVIATORS INCLUDED)

**Table 26 VGEP 10 YCS Retention Model-Pooled URL Sample: Aviators
included**

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	-.1306	<.3959	.000
VGEP	.2345	.1770	.058
FEMALE	-.4611	.0023	-.111
BLACK	.1978	.5427	.049
HISPANIC	-.5761	.0244	-.137
ASIAN	-.1704	.4716	-.042
OTHERMINORITY	.2017	.4915	.050
MAJGRP2	-.0741	.3840	-.018
MAJGRP3	-.3443	.0003	-.083
PRIOR1	.2868	.0374	.071
RECRATH	.0196	.8454	.004
SUB	-.1900	.0741	-.046
SPECWAR	.2800	.1577	.069
RLINE	.4170	.0036	.103
PILOT	1.1442	< .0001	.266
NFO	.8367	< .0001	.202
YR84	-.2076	.2626	-.051
YR85	-.4441	.0163	-.107
YR86	-.6398	.0008	-.151
YR87	-.3790	.0414	-.092
YR88	-.4343	.0146	-.104
YR89	-.5267	.0035	-.126
YR90	-.3419	.0622	-.083
YR91	-.1664	.3726	-.041
YR92	-.1809	.3136	-.044
YR93	-.3879	.0264	-.094
YR94	-.3586	.0456	-.087
YR95	.0323	.8508	.008
YR96	N/A	N/A	N/A
YR97	N/A	N/A	N/A
YR98	N/A	N/A	N/A
Log Likelihood Ratio = 293.41			
R-Squared = .1087			

**Table 27 VGEP 11 YCS Retention Model-Pooled URL Sample: Aviators
included**

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	-.2122	.1741	.000
VGEP	.2348	.1959	.058
FEMALE	-.4445	.0070	-.105
BLACK	.0833	.8165	.020
HISPANIC	-.6248	.0384	-.144
ASIAN	.00747	.9765	.001
OTHEMINORITY	.4024	.1974	.100
MAJGRP2	-.0819	.3549	-.020
MAJGRP3	-.3824	.0002	-.091
PRIOR1	.2691	.0617	.067
RECRATH	.0674	.5274	.016
SUB	-.1423	.2102	-.034
SPECWAR	.3479	.1016	.086
RLINE	.4420	.0038	.110
PILOT	.7374	<.0001	.181
NFO	.7761	<.0001	.190
YR84	-.1807	.3243	-.044
YR85	-.3938	.0314	-.094
YR86	-.5746	.0025	-.134
YR87	-.4189	.0233	-.099
YR88	-.4622	.0089	-.109
YR89	-.5042	.0049	-.118
YR90	-.5261	.0042	-.123
YR91	-.2621	.1559	-.063
YR92	-.2618	.1398	-.063
YR93	-.3616	.0363	-.086
YR94	-.3812	.0324	-.091
YR95	N/A	N/A	N/A
YR96	N/A	N/A	N/A
YR97	N/A	N/A	N/A
YR98	N/A	N/A	N/A
Log Likelihood Ratio = 150.59			
R-Squared = .0637			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 28 VGEP 12 YCS Retention Model-Pooled URL Sample: Aviators included

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	-.3191	.0467	.000
VGEP	.1904	.3187	.046
FEMALE	-.6702	.0003	-.149
BLACK	.1942	.6629	.047
HISPANIC	-.6617	.0487	-.148
ASIAN	.0415	.8738	.010
OTHERMINORITY	.4990	.1474	.123
MAJGRP2	-.0547	.5579	-.013
MAJGRP3	-.4313	<.0001	-.100
PRIOR1	.2884	.0638	.071
RECRATH	.0895	.4328	.021
SUB	-.1046	.3890	-.025
SPECWAR	.1646	.4985	.040
RLINE	.5244	.0015	.130
PILOT	.4432	.0005	.110
NFO	.6890	<.0001	.170
YR84	-.1998	.2775	-.047
YR85	-.3150	.0858	-.074
YR86	-.6961	.0003	-.154
YR87	-.5777	.0023	-.131
YR88	-.4198	.0183	-.097
YR89	-.4526	.0121	-.104
YR90	-.6528	.0005	-.146
YR91	-.1454	.4314	-.034
YR92	.0859	.6275	-.020
YR93	-.2355	.1730	-.056
YR94	N/A	N/A	N/A
YR95	N/A	N/A	N/A
YR96	N/A	N/A	N/A
YR97	N/A	N/A	N/A
YR98	N/A	N/A	N/A
Log Likelihood Ratio = 120.77			
R-Squared = .0569			

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APPENDIX B: SCHOLARSHIP RETENTION MODEL-POOLED URL SAMPLE (AVIATORS INCLUDED)

**Table 29 Scholarship 10 YCS Retention Model-Pooled URL Sample: Aviators
included**

VARIABLE	ESTIMATE	PR>CHISO	PARTIAL EFFECT
INTERCEPT	- .1326	.3254	.000
SCHOLAR	.0728	.6411	.018
FEMALE	-.4393	.0008	-.106
BLACK	.3678	.1676	.091
HISPANIC	-.2377	.2496	-.058
ASIAN	-.1731	.3814	-.042
OTHERMINORITY	.0864	.7209	.021
MAJGRP2	-.0201	.7897	-.005
MAJGRP3	-.3131	.0002	-.076
PRIOR1	.3410	.0034	.085
RECRATH	-.00336	.9686	-.000
SUB	-.2779	.0033	-.068
SPECWAR	.254	.1492	.063
RLINE	.3192	.0121	.079
PILOT	1.0883	<.0001	.255
NFO	.7499	<.0001	.182
YR84	-.2210	.1750	-.054
YR85	-.3788	.0184	-.092
YR86	-.5135	.0019	-.123
YR87	-.3913	.0157	-.094
YR88	-.3672	.0201	-.089
YR89	-.4834	.0023	-.116
YR90	-.3369	.0359	-.082
YR91	-.2194	.1808	-.054
YR92	-.1859	.2311	-.045
YR93	-.3296	.0315	-.080
YR94	-.2942	.0654	-.072
YR95	.0451	.7680	.011
YR96	N/A	N/A	N/A
YR97	N/A	N/A	N/A
YR98	N/A	N/A	N/A
Log Likelihood Ratio = 364.19			
R-Squared = .1053			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 30 Scholarship 11 YCS Retention Model-Pooled URL Sample: Aviators included

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	- .222	.1043	.000
SCHOLAR	.1608	.3335	.039
FEMALE	-.4201	.0032	-.099
BLACK	.1164	.6882	.028
HISPANIC	-.3348	.1558	-.080
ASIAN	-.0636	.7639	-.015
OTHERMINORITY	.2980	.2422	.074
MAJGRP2	-.0336	.6681	-.008
MAJGRP3	-.3194	.0003	-.076
PRIOR1	.3598	.0032	.089
RECRATH	.0178	.8436	.004
SUB	-.2001	.0466	-.048
SPECWAR	.4070	.0305	.101
RLINE	.3812	.0049	.094
PILOT	.7652	<.0001	.187
NFO	.7011	<.0001	.172
YR84	-.2095	.1936	-.050
YR85	-.3360	.0346	-.080
YR86	-.4495	.0060	-.106
YR87	-.4267	.0080	-.101
YR88	-.4238	.0069	-.100
YR89	-.5178	.0010	-.121
YR90	-.5866	.0003	-.136
YR91	-.3511	.0313	-.084
YR92	-.3328	.0303	-.079
YR93	-.3571	.0185	-.085
YR94	-.3140	.0475	-.075
YR95	N/A	N/A	N/A
YR96	N/A	N/A	N/A
YR97	N/A	N/A	N/A
YR98	N/A	N/A	N/A
Log Likelihood Ratio = 197.29			
R-Squared = .0645			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 31 Scholarship 12 YCS Retention Model-Pooled URL Sample: Aviators included

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	-.3285	.0192	.000
SCHOLAR	.2846	.1149	.070
FEMALE	-.5837	.0003	-.132
BLACK	.2797	.4147	.069
HISPANIC	-.3738	.1496	-.087
ASIAN	-.0130	.9525	-.003
OTHERMINORITY	.2365	.3927	.058
MAJGRP2	.0106	.8969	.002
MAJGRP3	-.3317	.0004	-.077
PRIOR1	.3515	.0069	.087
RECRATH	-.00803	.9337	-.001
SUB	-.1656	.1223	-.039
SPECWAR	.2902	.1687	.071
RLINE	.4600	.0017	.114
PILOT	.4887	<.0001	.121
NFO	.6111	<.0001	.151
YR84	-.2140	.1850	-.051
YR85	-.3135	.0492	-.073
YR86	-.5485	.0010	-.124
YR87	-.5333	.0011	-.121
YR88	-.4197	.0079	-.097
YR89	-.4990	.0017	-.114
YR90	-.7148	<.0001	-.158
YR91	-.3125	.0562	-.073
YR92	-.1819	.2354	-.043
YR93	-.2763	.0685	-.065
YR94	N/A	N/A	N/A
YR95	N/A	N/A	N/A
YR96	N/A	N/A	N/A
YR97	N/A	N/A	N/A
YR98	N/A	N/A	N/A
Log Likelihood Ratio = 142.57			
R-Squared = .0518			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

APPENDIX C: IMPACT OF VGEP PARTICIPATION BY COMMUNITY

Tables 32-49 show the impact of VGEP on each community. A binary logit regression model was estimated for retention to years of service seven through ten for Surface Warfare, Submarine Warfare, and Special Warfare Officers and years of service ten through twelve years for Pilots and NFOs. A separate model was estimated for each community to determine if retention was affected by an officer's community.

The retention results for each community are discussed in Chapter IV.

A. LOGIT RESULTS: SURFACE WARFARE OFFICERS

Table 32 Impact of VGEP on Surface Warfare Officer Retention to 7 YCS

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	.8102	.0119	.000
VGEP	.7034	.0700	.127
FEMALE	-.1813	.3746	-.039
BLACK	.1953	.7685	.040
HISPANIC	.5217	.2620	.099
ASIAN	.0524	.8987	.011
OTHERMINORITY	.1199	.7867	.024
MAJGRP2	-.0161	.9250	-.003
MAJGRP3	-.1983	.2231	-.043
PRIOR1	-.1593	.5382	-.034
YR84	-.4797	.2624	-.110
YR85	-.5043	.2515	-.116
YR86	-.3506	.3970	-.079
YR87	-.5651	.1736	-.131
YR88	-.8662	.0413	-.206
YR89	-.8927	.0342	-.212
YR90	-1.0302	.0183	-.246
YR91	-.6635	.1285	-.155
YR92	-.5056	.2252	-.116
YR93	-.3071	.4758	-.068

YR94	-.6573	.0960	-.154
YR95	.0267	.9463	.005
YR96	.6444	.1221	.118
YR97	-.2783	.4729	-.062
YR98	-.0617	.8802	-.013
Log Likelihood Ratio = 44.44			
R-Squared = .0611			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 33 Impact of VGEP on Surface Warfare Officer Retention to 8 YCS

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	.4979	.1083	.000
VGEP	.3789	.2883	.084
FEMALE	-.1144	.5958	-.027
BLACK	.4971	.4665	.108
HISPANIC	.1363	.7563	.031
ASIAN	.2022	.6290	.046
OTHERMINORITY	.1296	.7695	.029
MAJGRP2	.1750	.3137	.040
MAJGRP3	-.2885	.0838	-.069
PRIOR1	.0352	.8938	.008
YR84	-.6267	.1338	-.154
YR85	-.5940	.1662	-.145
YR86	-.3831	.3383	-.093
YR87	-.7329	.0719	-.180
YR88	-.6869	.0990	-.169
YR89	-1.2060	.0046	-.291
YR90	-.9486	.0283	-.232
YR91	-.8747	.0427	-.215
YR92	-.4250	.2957	-.103
YR93	-.8804	.0361	-.264
YR94	-.8894	.0222	-.218
YR95	-.2411	.5237	-.058
YR96	.1535	.6883	.035

YR97	-.2843	.4496	-.068
YR98	N/A	N/A	N/A
Log Likelihood Ratio = 37.97			
R-Squared =.0556			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 34 Impact of VGEP on Surface Warfare Officer Retention to 9 YCS

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	.1960	.5525	.000
VGEP	.5439	.1335	.128
FEMALE	.0927	.6992	.022
BLACK	.7616	.3161	.173
HISPANIC	-.1712	.7215	-.042
ASIAN	-.0226	.9592	-.005
OTHERMINORITY	.6358	.1958	.147
MAJGRP2	.3456	.0580	.083
MAJGRP3	-.1063	.5536	.026
PRIOR1	.2705	.3438	.065
YR84	-.5838	.1614	-.144
YR85	-.6996	.1044	-.172
YR86	-.8604	.0325	-.209
YR87	-.7761	.0572	-.189
YR88	-.8684	.0386	-.210
YR89	-1.0795	.0107	-.256
YR90	-1.1166	.0114	-.264
YR91	-.8514	.0500	-.207
YR92	-.3368	.4041	-.083
YR93	-.7793	.0633	-.190
YR94	-.8500	.0289	-.206
YR95	-.1593	.6710	-.039
YR96	-.1023	.7855	-.025
YR97	N/A	N/A	N/A
YR98	N/A	N/A	N/A

Log Likelihood Ratio = 35.06
R-Squared = .0574

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 35 Impact of VGEP on Surface Warfare Officer Retention to 10 YCS

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	.0145	.9621	.000
VGEP	.3698	.3143	.091
FEMALE	.2158	.4363	.053
BLACK	.8984	.2375	.209
HISPANIC	-.1580	.7687	-.039
ASIAN	-.3498	.5099	-.086
OTHERMINORITY	.8063	.1210	.190
MAJGRP2	.2663	.1666	.066
MAJGRP3	-.2789	.1535	-.069
PRIOR1	.0947	.7614	.023
YR84	-.3265	.4319	-.081
YR85	-.5314	.2186	-.130
YR86	-.5694	.1549	-.138
YR87	-.5225	.1982	-.127
YR88	-.6235	.1359	-.151
YR89	-.7979	.0583	-.190
YR90	-.8412	.0560	-.199
YR91	-.5840	.1779	-.142
YR92	-.0881	.8266	-.022
YR93	-.7558	.0761	-.180
YR94	-.7061	.0708	-.169
YR95	-.0513	.8910	-.012
YR96	N/A	N/A	N/A
YR97	N/A	N/A	N/A
YR98	N/A	N/A	N/A
Log Likelihood Ratio = 24.95			
R-Squared = .0464			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

B. LOGIT RESULTS: SUBMARINE WARFARE OFFICERS

Table 36 Impact of VGEP on Submarine Warfare Officer Retention to 7 YCS

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	.9857	<.0001	.000
VGEP	.7215	.0183	.118
BLACK	.4912	.3537	.085
HISPANIC	-.0201	.9624	-.003
ASIAN	-.3932	.2587	-.084
OTHERMINORITY	.1363	.7584	.026
MAJGRP2	-.1441	.2976	-.029
MAJGRP3	-.2177	.2644	-.045
PRIOR1	.1486	.4862	.028
YR84	-.3335	.2651	-.070
YR85	-.5834	.0538	-.128
YR86	-.6859	.0252	-.153
YR87	-.4606	.1387	-.099
YR88	-.6685	.0265	-.149
YR89	-.5304	.0645	-.116
YR90	-.2913	.3587	-.061
YR91	.2646	.4756	.049
YR92	-.1656	.6323	-.033
YR93	-.8415	.0070	-.192
YR94	-.5428	.0929	-.119
YR95	-.1673	.6171	-.034
YR96	1.0818	.0251	.159
YR97	.3513	.3318	.063
YR98	-.0976	.7632	-.0
Log Likelihood Ratio = 53.74			
R-Squared = .0561			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 37 Impact of VGEP on Submarine Warfare Officer Retention to 8 YCS

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	.5414	.0085	.000

VGEP	.2198	.4093	.049
BLACK	.1909	.6896	.043
HISPANIC	-.6275	.1678	-.153
ASIAN	-.3224	.3799	-.077
OTHERMINORITY	.0399	.9257	-.009
MAJGRP2	-.1339	.3252	-.031
MAJGRP3	-.0398	.8377	-.009
PRIOR1	.3434	.0983	.075
YR84	-.3201	.2571	-.077
YR85	-.5552	.0553	-.135
YR86	-.7078	.0169	-.173
YR87	-.7588	.0108	-.186
YR88	-.8542	.0035	-.209
YR89	-.8328	.0017	-.211
YR90	-.5725	.0545	-.139
YR91	-.4436	.1692	-.107
YR92	-.2982	.3593	-.071
YR93	-1.0332	.0008	-.252
YR94	-.9508	.0023	-.233
YR95	-.5073	.1018	-.123
YR96	.2942	.4133	.065
YR97	-.4525	.1479	-.109
YR98	N/A	N/A	N/A
Log Likelihood Ratio = 40.81			
R-Squared = .0440			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 38 Impact of VGEP on Submarine Warfare Officer Retention to 9 YCS

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
-----------------	-----------------	--------------------	-----------------------

INTECEPT	.0290	.8859	.000
VGEP	.4759	.0843	.116
BLACK	.0963	.8485	.024
HISPANIC	-.9426	.0959	-.220
ASIAN	-1.2794	.0202	-.284
OTHERMINORITY	.4899	.2904	.119
MAJGRP2	-.0727	.6209	-.018
MAJGRP3	-.0918	.6655	-.022
PRIOR1	.5193	.0205	.126
YR84	-.4240	.1312	-.104
YR85	-.6455	.0278	-.156
YR86	-.9836	.0016	-.229
YR87	-.8097	.0081	-.193
YR88	-.5445	.0638	-.133
YR89	-.9193	.0012	-.216
YR90	-.5213	.0818	-.127
YR91	-.2362	.4621	-.058
YR92	-.8732	.0118	-.206
YR93	-.7735	.0131	-.185
YR94	-1.0020	.0020	-.232
YR95	-.7924	.0133	-.189
YR96	-.1956	.5613	-.048
YR97	N/A	N/A	N/A
YR98	N/A	N/A	N/A
Log Likelihood Ratio = 45.85			
R-Squared =.0536			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 39 Impact of VGEP on Submarine Warfare Officer Retention to 10 YCS

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	.0295	.8846	.000
VGEP	.2622	.3614	.065
BLACK	.0869	.8686	.021
HISPANIC	-1.0488	.0993	-.242
ASIAN	-1.5225	.0141	-.323
OTHERMINORITY	.1286	.7899	.032
MAJGRP2	-.1263	.4054	-.031
MAJGRP3	-.1222	.5773	-.030
PRIOR1	.5311	.0253	.129
YR84	-.5426	.0559	-.132
YR85	-.6506	.0273	-.157
YR86	-1.0578	.0009	-.243
YR87	-.7682	.0121	-.184
YR88	.5388	.0679	-.132
YR89	-.9050	.0015	-.213
YR90	-.5673	.0600	-.138
YR91	-.3183	.3242	-.079
YR92	-.9967	.0052	-.231
YR93	-.7981	.0110	-.190
YR94	-1.1486	.0006	-.261
YR95	-.7223	.0241	-.173
YR96	N/A	N/A	N/A
YR97	N/A	N/A	N/A
YR98	N/A	N/A	N/A
Log Likelihood Ratio = 42.68			
R-Squared = .0529			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

C. LOGIT RESULTS: SPECIAL WARFARE OFFICERS

Table 40 Impact of VGEP on Special Warfare Officer Retention to 7 YCS

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	1.550	<.0001	.000
VGEP	-.2775	.7635	-.044
MAJGRP2	-.1644	.6780	-.025
MAJGRP3	-.8712	.0145	-.161
PRIOR1	-.5709	.2904	-.098
Log Likelihood Ratio = 7.91			
R-Squared = .0484			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 41 Impact of VGEP on Special Warfare Officer Retention to 8 YCS

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	1.089	<.0001	.000
VGEP	-1.3822	.1265	-.321
MAJGRP2	-.3860	.2885	-.079
MAJGRP3	-.7888	.0233	-.174
PRIOR1	-.2326	.6832	-.046
Log Likelihood Ratio = 8.79			
R-Squared = .0548			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 42 Impact of VGEP on Special Warfare Officer Retention to 9 YCS

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	.8410	.0004	.000
VGEP	-.8919	.3515	-.211
MAJGRP2	-.2884	.4341	-.064
MAJGRP3	-.7856	.0272	-.184
PRIOR1	-.3387	.5695	-.076
Log Likelihood Ratio = 6.58			
R-Squared = .0446			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 43 Impact of VGEP on Special Warfare Officer Retention to 10 YCS

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	.5148	.0308	.000
VGEP	-.10171	.4184	-.249
MAJGRP2	-.1795	.6321	-.043
MAJGRP3	-.5333	.1458	-.131
PRIOR1	-.0840	.8878	-.019
Log Likelihood Ratio = 3.76			
R-Squared = .0279			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

D. LOGIT RESULTS: PILOTS

Table 44 Impact of VGEP on Pilot Retention to 10 YCS

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	.3391	.2394	.000
VGEP	.6952	.0852	.153
FEMALE	-.7813	.0237	-.192
BLACK	.1328	.8577	.031
HISPANIC	-.9144	.0767	-.223
ASIAN	-.2518	.7588	-.062
OTHERMINORITY	-.1304	.8820	.031
MAJGRP2	-.552	.0039	-.137
MAJGRP3	-.7574	.0002	-.187
PRIOR1	.4426	.1701	.102
YR84	-.2513	.5678	-.062
YR85	-.4082	.3249	-.101
YR86	-.7237	.1108	-.178
YR87	-.0274	.9443	-.006
YR88	-.1085	.7667	-.026
YR89	.3674	.3545	.085
YR90	1.3072	.0016	.254
YR91	.5959	.1147	.134
YR92	1.2856	.0006	.251

YR93	1.1472	.0016	.231
YR94	2.4265	<.0001	.356
YR95	1.6355	<.0001	.294
YR96	N/A	N/A	N/A
YR97	N/A	N/A	N/A
YR98	N/A	N/A	N/A
Log Likelihood Ratio = 130.89			
R-Squared = .2003			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 45 Impact of VGEP on Pilot Retention to 11 YCS

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	.0932	.7451	.000
VGEP	.6979	.0738	.164
FEMALE	-.3300	.3765	-.082
BLACK	.8641	.3240	.199
HISPANIC	-1.6334	.0184	-.346
ASIAN	.8394	.3603	.194
OTHERMINORITY	.3803	.6801	.092
MAJGRP2	-.4417	.0208	-.109
MAJGRP3	-.6970	.0008	-.169
PRIOR1	.4910	.1210	.118
YR84	-.2841	.5208	-.070
YR85	-.4377	.2946	-.108
YR86	-.8544	.0661	-.204
YR87	-.3266	.4072	-.081
YR88	-.3478	.3474	-.086
YR89	.1663	.6717	.041
YR90	.5604	.1420	.134
YR91	.0715	.8464	.017
YR92	.7260	.0391	.170
YR93	.7919	.0227	.184
YR94	1.7753	<.0001	.343
YR95	N/A	N/A	N/A

YR96	N/A	N/A	N/A
YR97	N/A	N/A	N/A
YR98	N/A	N/A	N/A
Log Likelihood Ratio = 88.84			
R-Squared = .1533			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 46 Impact of VGEP on Pilot Retention to 12 YCS

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	-.1468	.6127	.000
VGEP	.3719	.3470	.092
FEMALE	-.6773	.1122	-.158
BLACK	.9325	.3096	.223
HISPANIC	-2.1346	.0447	-.370
ASIAN	.9488	.3001	.227
OTHERMINORITY	.5908	.5275	.145
MAJGRP2	-.3012	.1299	-.073
MAJGRP3	-.6522	.0034	-.153
PRIOR1	.4095	.2033	.101
YR84	-.0537	.9035	-.013
YR85	-.2930	.4872	-.071
YR86	-.7536	.1109	-.174
YR87	-1.1074	.0118	-.241
YR88	-.3397	.3675	-.082
YR89	.2994	.4480	.074
YR90	-.0827	.8298	-.020
YR91	.1049	.7780	.026
YR92	.8971	.0112	.215
YR93	.9288	.0075	.222
YR94	N/A	N/A	N/A
YR95	N/A	N/A	N/A
YR96	N/A	N/A	N/A
YR97	N/A	N/A	N/A
YR98	N/A	N/A	N/A

Log Likelihood Ratio = 78.42
R-Squared = .1494

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

E. LOGIT RESULTS: NAVAL FLIGHT OFFICERS (NFO)

Table 47 Impact of VGEP on NFO Retention to 10 YCS

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	.2997	.3995	.000
VGEP	-.0320	.9544	-.007
FEMALE	.2330	.6292	.055
BLACK	.8877	.4625	.191
HISPANIC	-.6675	.2797	-.165
ASIAN	-.1641	.7554	-.040
OTHERMINORITY	1.1772	.3109	.239
MAJGRP2	-.5285	.0382	-.131
MAJGRP3	-.5952	.0135	-.147
PRIOR1	.6073	.1608	.138
YR84	.1707	.7405	.041
YR85	.4307	.3931	.100
YR86	.5971	.2657	.135
YR87	.5543	.3293	.127
YR88	.4266	.3778	.099
YR89	.5158	.3606	.118
YR90	.1088	.8208	.026
YR91	.4928	.3400	.114
YR92	.2738	.5663	.065
YR93	.9410	.0530	.201
YR94	-.1618	.7411	-.039
YR95	.7307	.1171	.162
YR96	N/A	N/A	N/A
YR97	N/A	N/A	N/A
YR98	N/A	N/A	N/A

Log Likelihood Ratio = 21.82
R-Squared = .0623

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 48 Impact of VGEP on NFO Retention to 11 YCS

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	.2285	.5235	.000
VGEP	.1504	.7901	.036
FEMALE	.1527	.7840	.037
BLACK	-.1006	.9247	-.024
HISPANIC	-.7160	.3359	-.176
ASIAN	.0635	.9131	.015
OTHERMINORITY	1.4733	.2106	.288
MAJGRP2	-.6781	.0108	-.167
MAJGRP3	-.8353	.0013	-.204
PRIOR1	.6189	.1719	.143
YR84	.3387	.5132	.081
YR85	.4759	.3254	.112
YR86	.7265	.1782	.165
YR87	.6846	.2312	.156
YR88	.3564	.4595	.085
YR89	.6220	.2730	.143
YR90	.0694	.8862	.017
YR91	.4229	.4133	.100
YR92	.2192	.6464	.053
YR93	.9003	.0614	.198
YR94	-.3356	.5003	-.083
YR95	N/A	N/A	N/A
YR96	N/A	N/A	N/A
YR97	N/A	N/A	N/A
YR98	N/A	N/A	N/A
Log Likelihood Ratio = 28.62			
R-Squared = .0899			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 49 Impact of VGEP on NFO Retention to 12 YCS

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	.1086	.7620	.000
VGEP	.1134	.8400	.028
FEMALE	.1936	.7344	.047
BLACK	.4368	.7262	.105
HISPANIC	-.7137	.4216	-.173
ASIAN	.1736	.7738	.042
OTHERMINORITY	N/A	N/A	N/A
MAJGRP2	-.7076	.0098	-.172
MAJGRP3	-.8435	.0023	-.203
PRIOR1	.6215	.1861	.147
YR84	.1739	.7365	.043
YR85	.4530	.3495	.109
YR86	-.2177	.6818	-.054
YR87	.1892	.7361	.046
YR88	.2678	.5773	.065
YR89	.3742	.5000	.091
YR90	-.0265	.9568	-.006
YR91	.5485	.2914	.131
YR92	.3310	.4896	.081
YR93	.7936	.0963	.184
YR94	N/A	N/A	N/A
YR95	N/A	N/A	N/A
YR96	N/A	N/A	N/A
YR97	N/A	N/A	N/A
YR98	N/A	N/A	N/A
Log Likelihood Ratio = 26.77			
R-Squared = .0917			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

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APPENDIX D: IMPACT OF SCHOLARSHIP PARTICIPATION BY COMMUNITY

Tables 50-62 show the impact of Scholarship on each community. A binary logit regression model was estimated for retention to years of service seven through ten for Surface Warfare, Submarine Warfare, and Special Warfare Officers and years of service ten through twelve years for Pilots and NFOs. A model was run for each community to determine if retention was affected by an officer's community.

The retention results for each community are discussed in Chapter IV.

A. LOGIT RESULTS: SURFACE WARFARE OFFICERS

Table 50 Impact of Scholarship on Surface Warfare Officer Retention to 7 YCS

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	.6340	.0218	.000
SCHOLAR	.6590	.0661	.131
FEMALE	-.2860	.1070	-.067
BLACK	.8002	.1788	.154
HISPANIC	.3761	.3030	.079
ASIAN	.1874	.5776	.041
OTHERMINORITY	.1641	.6576	.036
MAJGRP2	.0953	.5270	.021
MAJGRP3	-.1407	.3213	-.032
PRIOR1	-.0429	.8430	-.009
YR84	-.3440	.3576	-.081
YR85	-.1867	.6187	-.043
YR86	-.1023	.7788	-.023
YR87	-.4070	.2623	-.096
YR88	-.4532	.2180	-.108
YR89	-.8468	.0198	-.206
YR90	-.8906	.0184	-.217
YR91	-.4251	.2585	-.101
YR92	-.2247	.5316	-.052
YR93	-.1837	.6174	-.042

YR94	-.5818	.0869	-.140
YR95	.1767	.6082	.038
YR96	.8203	.0279	.157
YR97	-.2121	.5327	-.049
YR98	.1158	.7434	.025
Log Likelihood Ratio = 58.03			
R-Squared = .0609			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 51 Impact of Scholarship on Surface Warfare Officer Retention to 8 YCS

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	.4229	.1170	.000
SCHOLAR	.9648	.0085	.196
FEMALE	-.2530	.1848	-.061
BLACK	.8603	.1258	.178
HISPANIC	.0705	.8457	.016
ASIAN	.0987	.7685	.023
OTHERMINORITY	.0847	.8208	.020
MAJGRP2	.1842	.2245	.043
MAJGRP3	-.1767	.2249	-.042
PRIOR1	-.0626	.7740	-.015
YR84	-.5522	.1336	-.136
YR85	-.3257	.3738	-.079
YR86	-.2789	.4311	-.068
YR87	-.6516	.0690	-.161
YR88	-.3865	.2869	-.095
YR89	-1.0347	.0046	-.252
YR90	-.8808	.0195	-.216
YR91	-.7781	.0373	-.192
YR92	-.4150	.2379	-.102
YR93	-.7060	.0503	-.174
YR94	-.8305	.0141	-.204
YR95	-.1005	.7619	-.024
YR96	.2691	.4319	.062

YR97	-.3242	.3308	-.079
YR98	N/A	N/A	N/A
Log Likelihood Ratio = 54.60			
R-Squared = .0612			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 52 Impact of Scholarship on Surface Warfare Officer Retention to 9 YCS

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	.1372	.6066	.000
SCHOLAR	.3824	.2900	.092
FEMALE	-.0250	.9052	-.006
BLACK	1.1460	.0623	.248
HISPANIC	-.0878	.8177	-.021
ASIAN	-.1562	.6553	-.038
OTHERMINORITY	.3777	.3542	.091
MAJGRP2	.2897	.0667	.070
MAJGRP3	-.0101	.9477	-.002
PRIOR1	.0959	.6775	.023
YR84	-.4746	.1955	-.117
YR85	-.4781	.1907	-.118
YR86	-.6614	.0618	-.162
YR87	-.6185	.0834	-.152
YR88	-.4911	.1731	-.121
YR89	-.8528	.0186	-.205
YR90	-1.0270	.0074	-.243
YR91	-.7150	.0557	-.174
YR92	-.2877	.4091	-.071
YR93	-.6736	.0615	-.165
YR94	-.7857	.0199	-.190
YR95	.0149	.9638	.003
YR96	.0599	.8579	.014
YR97	N/A	N/A	N/A
YR98	N/A	N/A	N/A

Log Likelihood Ratio = 39.83
R-Squared = .0497

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 53 Impact of Scholarship on Surface Warfare Officer Retention to 10 YCS

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	-.0090	.9721	.000
SCHOLAR	.2981	.4664	.074
FEMALE	.0180	.9397	.004
BLACK	1.2018	.0548	.269
HISPANIC	-.0100	.9802	-.002
ASIAN	-.3125	.4269	-.077
OTHERMINORITY	.3296	.4386	.081
MAJGRP2	.2269	.1722	.056
MAJGRP3	-.1312	.4292	-.032
PRIOR1	-.0724	.7714	-.018
YR84	-.2695	.4614	-.066
YR85	-.3302	.3664	-.081
YR86	-.4534	.1993	-.111
YR87	-.4110	.2485	-.101
YR88	-.2806	.4350	-.069
YR89	-.6894	.0578	-.165
YR90	-.7918	.0384	-.187
YR91	-.5827	.1200	-.141
YR92	-.1021	.7693	-.025
YR93	-.6286	.0839	-.151
YR94	-.6953	.0408	-.166
YR95	.0978	.7654	.024
YR96	N/A	N/A	N/A
YR97	N/A	N/A	N/A
YR98	N/A	N/A	N/A
Log Likelihood Ratio = 29.01			
R-Squared = .0405			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

B. LOGIT RESULTS: SUBMARINE WARFARE OFFICERS

Table 54 Impact of Scholarship on Submarine Warfare Officer Retention to 7 YCS

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	.9226	<.0001	.000
SCHOLAR	1.7576	<.0001	.220
BLACK	.4057	.4073	.075
HISPANIC	.0283	.9393	.005
ASIAN	-.1524	.6235	-.032
OTHERMINORITY	.1634	.6976	.032
MAJGRP2	-.0633	.6188	-.013
MAJGRP3	-.0544	.7653	-.011
PRIOR1	.1767	.3562	.034
YR84	-.3938	.1793	-.086
YR85	-.6623	.0141	-.150
YR86	-.7396	.0060	-.169
YR87	-.5716	.0400	-.128
YR88	-.6858	.0147	-.156
YR89	-.6218	.0171	-.140
YR90	-.4901	.0859	-.109
YR91	.0431	.8945	.008
YR92	-.4917	.1191	-.109
YR93	-.9480	.0012	-.221
YR94	-.6841	.0252	-.156
YR95	-.2826	.3723	-.060
YR96	.8394	.0499	.137
YR97	.3643	.2758	.068
YR98	-.0288	.9247	-.005
Log Likelihood Ratio = 102.59			
R-Squared = .0883			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 55 Impact of Scholarship on Submarine Warfare Officer Retention to 8 YCS

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	.3964	.0326	.000
SCHOLAR	1.4593	<.0001	.266
BLACK	.1176	.7887	.027
HISPANIC	-.5197	.1831	-.128
ASIAN	-.2520	.4379	-.061
OTHERMINORITY	.1849	.6492	.043
MAJGRP2	.00053	.9966	.000
MAJGRP3	.0115	.9498	.002
PRIOR1	.4991	.0077	.112
YR84	-.3217	.2150	-.079
YR85	-.6560	.0116	-.162
YR86	-.7096	.0065	-.175
YR87	-.7743	.0039	-.191
YR88	-.7921	.0038	-.195
YR89	-.8843	.0005	-.217
YR90	-.7944	.0037	-.196
YR91	-.6434	.0283	-.159
YR92	-.5717	.0565	-.141
YR93	-1.2633	<.0001	-.301
YR94	-1.0618	.0004	-.258
YR95	-.6815	.0216	-.168
YR96	.2866	.3965	.066
YR97	-.4188	.1430	-.103
YR98	N/A	N/A	N/A
Log Likelihood Ratio = 97.02			
R-Squared = .0866			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 56 Impact of Scholarship on Submarine Warfare Officer Retention to 9 YCS

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	-.0424	.8166	.000
SCHOLAR	-.0405	.8530	-.010
BLACK	.3233	.4637	.080
HISPANIC	-.5784	.1769	-.139
ASIAN	-1.0924	.0164	-.246
OTHERMINORITY	.3692	.3937	.091
MAJGRP2	-.0101	.9405	-.002
MAJGRP3	-.1108	.5782	-.027
PRIOR1	.6606	.0008	.160
YR84	-.4049	.1177	-.099
YR85	-.6238	.0176	-.150
YR86	-.8835	.0020	-.195
YR87	-.8049	.0036	-.189
YR88	-.5008	.0688	-.121
YR89	-.8576	.0009	-.200
YR90	-.5717	.0369	-.138
YR91	-.3023	.2976	-.074
YR92	-.8392	.0074	-.196
YR93	-.8064	.0057	-.189
YR94	-.8838	.0034	-.205
YR95	-.7712	.0110	-.182
YR96	.00546	.9861	.001
YR97	N/A	N/A	N/A
YR98	N/A	N/A	N/A
Log Likelihood Ratio = 51.07			
R-Squared = .0505			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 57 Impact of Scholarship on Submarine Warfare Officer Retention to 10 YCS

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	-.0567	.7587	.000
SCHOLAR	-.0921	.6944	-.022
BLACK	.3570	.4303	.088
HISPANIC	-.8205	.1052	-.192
ASIAN	-1.5113	.0050	-.313
OTHERMINORITY	-.0443	.9249	-.011
MAJGRP2	-.0668	.6331	-.016
MAJGRP3	-.1832	.3761	-.045
PRIOR1	.6979	.0008	.169
YR84	-.5021	.0555	-.122
YR85	-.6148	.0201	-.147
YR86	-.9546	.0006	-.219
YR87	-.8009	.0040	-.187
YR88	-.4736	.0876	-.115
YR89	-.8329	.0014	-.194
YR90	-.6060	.0285	-.145
YR91	-.3458	.2379	-.085
YR92	-.8996	.0052	-.208
YR93	-.8065	.0062	-.189
YR94	-1.0019	.0013	-.228
YR95	-.6864	.0242	-.163
YR96	N/A	N/A	N/A
YR97	N/A	N/A	N/A
YR98	N/A	N/A	N/A
Log Likelihood Ratio = 50.33			
R-Squared = .0528			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

C. LOGIT RESULTS: SPECIAL WARFARE OFFICERS

Table 58 Impact of Scholarship on Special Warfare Officer Retention 7 YCS

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	1.395	<.0001	.000
SCHOLAR	.0678	.9350	.011
MAJGRP2	.0487	.8899	.007
MAJGRP3	-.7827	.0138	-.153
PRIOR1	-.2087	.6833	-.035
Log Likelihood Ratio = 8.54			
R-Squared = .0423			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 59 Impact of Scholarship on Special Warfare Officer Retention 8 YCS

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	.9983	<.0001	.000
SCHOLAR	-.2713	.7211	-.057
MAJGRP2	-.2023	.5323	-.141
MAJGRP3	-.8274	.0081	-.188
PRIOR1	.0122	.9817	.002
Log Likelihood Ratio = 8.03			
R-Squared = .0406			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 60 Impact of Scholarship on Special Warfare Officer Retention 9 YCS

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	.8007	.0002	.000
SCHOLAR	-.3405	.6691	-.077
MAJGRP2	-.1725	.6020	-.038
MAJGRP3	-.8090	.0117	-.192
PRIOR1	-.0202	.9704	-.004
Log Likelihood Ratio = 7.22			
R-Squared = .0394			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 61 Impact of Scholarship on Special Warfare Officer Retention 10 YCS

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	.5639	.0113	.000
SCHOLAR	-1.1394	.2024	-.277
MAJGRP2	-.1331	.6936	-.031
MAJGRP3	-.6005	.0715	-.147
PRIOR1	.0570	.9180	.013
Log Likelihood Ratio = 5.33			
R-Squared = .0319			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

D. LOGIT RESULTS: PILOTS

Table 62 Impact of Scholarship on Pilot Retention to 10 YCS

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	.4532	.0633	.000
SCHOLAR	.7536	.1408	.158
FEMALE	-.7917	.0074	-.195
BLACK	.2633	.7120	.060
HISPANIC	-.4069	.3418	-.099
ASIAN	-.3880	.5035	-.095
OTHERMINORITY	-.00689	.9912	-.001
MAJGRP2	-.4571	.0058	-.112
MAJGRP3	-.6858	<.0001	-.169
PRIOR1	.4476	.0994	.099
YR84	-.3151	.3743	-.076
YR85	-.3355	.3398	-.082
YR86	-.6402	.0848	-.158
YR87	-.0369	.9088	-.008
YR88	-.2920	.3503	-.071
YR89	.2443	.4611	.056
YR90	.9862	.0053	.196
YR91	.4471	.1740	.099
YR92	.9535	.0018	.191

YR93	1.0767	.0005	.210
YR94	2.2767	<.0001	.327
YR95	1.3854	<.0001	.251
YR96	N/A	N/A	N/A
YR97	N/A	N/A	N/A
YR98	N/A	N/A	N/A
Log Likelihood Ratio = 149.48			
R-Squared = .1718			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 63 Impact of Scholarship on Pilot Retention 11 YCS

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	.2647	.2735	.000
SCHOLAR	1.0816	.0357	.227
FEMALE	-.6627	.0377	-.164
BLACK	.3555	.6383	.084
HISPANIC	-.7858	.0933	-.193
ASIAN	-.0675	.9094	-.016
OTHERMINORITY	.3074	.6324	.073
MAJGRP2	-.3397	.0379	-.084
MAJGRP3	-.5279	.0017	-.131
PRIOR1	.5086	.0574	.118
YR84	-.3369	.3411	-.083
YR85	-.3531	.3140	-.087
YR86	-.6918	.0649	-.170
YR87	-.2567	.4233	-.063
YR88	-.5641	.0739	-.140
YR89	-.0602	.8542	-.014
YR90	.2035	.5347	.049
YR91	-.0055	.9862	-.001
YR92	.3512	.2255	.083
YR93	.6416	.0289	.146
YR94	1.6492	<.0001	.305
YR95	N/A	N/A	N/A

YR96	N/A	N/A	N/A
YR97	N/A	N/A	N/A
YR98	N/A	N/A	N/A
Log Likelihood Ratio = 99.15			
R-Squared =.1267			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 64 Impact of Scholarship on Pilot Retention to 12 YCS

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	.0248	.9184	.000
SCHOLAR	1.2566	.0166	.276
FEMALE	-.9513	.0099	-.222
BLACK	.4464	.5715	.109
HISPANIC	-.6362	.2105	-.154
ASIAN	.0638	.9146	.015
OTHERMINORITY	.1139	.8567	.028
MAJGRP2	-.1695	.3152	-.042
MAJGRP3	-.3937	.0255	-.097
PRIOR1	.4240	.1144	.104
YR84	-.1962	.5786	-.048
YR85	-.2152	.5388	-.053
YR86	-.5657	.1331	-.138
YR87	-.7516	.0244	-.180
YR88	-.5904	.0645	-.143
YR89	-.0298	.9277	-.007
YR90	-.4631	.1647	-.114
YR91	-.1968	.5411	-.049
YR92	.4750	.0998	.116
YR93	.7053	.0152	.168
YR94	N/A	N/A	N/A
YR95	N/A	N/A	N/A
YR96	N/A	N/A	N/A
YR97	N/A	N/A	N/A
YR98	N/A	N/A	N/A

Log Likelihood Ratio = 75.81
R-Squared = .1065

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

E. LOGIT RESULTS: NAVAL FLIGHT OFFICERS (NFO)

Table 65 Impact of Scholarship on NFO Retention to 10 YCS

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	.3038	.3369	.000
SCHOLAR	-.0828	.8741	-.019
FEMALE	-.00420	.9915	-.001
BLACK	-.1926	.7947	-.046
HISPANIC	.4158	.3964	.093
ASIAN	.1324	.7889	.031
OTHERMINORITY	.7743	.2802	.163
MAJGRP2	-.2046	.3407	-.049
MAJGRP3	-.6518	.0014	-.161
PRIOR1	.5212	.1405	.115
YR84	-.00075	.9986	-.000
YR85	-.0693	.8672	-.016
YR86	.2129	.6388	.049
YR87	.0328	.9458	.007
YR88	.1699	.6803	.039
YR89	.1023	.8188	.024
YR90	-.1701	.6703	-.041
YR91	.1327	.7559	.031
YR92	.2289	.5750	.053
YR93	.7609	.0683	.160
YR94	-.2464	.5645	-.060
YR95	.3680	.3546	.083
YR96	N/A	N/A	N/A
YR97	N/A	N/A	N/A
YR98	N/A	N/A	N/A

Log Likelihood Ratio = 19.83
R-Squared = .0462

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 66 Impact of Scholarship on NFO Retention to 11 YCS

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	.3178	.2390	.000
SCHOLAR	-.4249	.4466	-.105
FEMALE	.0540	.9033	.013
BLACK	-.5404	.4785	-.134
HISPANIC	.0187	.9715	.004
ASIAN	.3565	.5104	.083
OTHERMINORITY	1.3371	.1150	.260
MAJGRP2	-.2993	.1769	-.074
MAJGRP3	-.7560	.0006	-.186
PRIOR1	.3511	.3409	.082
YR84	-.0420	.9231	-.010
YR85	.0187	.9639	.004
YR86	.3978	.3798	.092
YR87	.1792	.7102	.042
YR88	.1014	.8039	.024
YR89	.1494	.7363	.035
YR90	-.3786	.3447	-.093
YR91	.0458	.9142	.011
YR92	.1731	.6679	.041
YR93	.7787	.0584	.170
YR94	-.3472	.4184	-.086
YR95	N/A	N/A	N/A
YR96	N/A	N/A	N/A
YR97	N/A	N/A	N/A
YR98	N/A	N/A	N/A
Log Likelihood Ratio = 29.73			
R-Squared = .0689			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

Table 67 Impact of Scholarship on NFO Retention to 12 YCS

VARIABLE	ESTIMATE	PR>CHISQ	PARTIAL EFFECT
INTERCEPT	.0429	.8865	.000
SCHOLAR	-.1457	.8133	-.036
FEMALE	.1506	.7572	.037
BLACK	-.7864	.3750	-.188
HISPANIC	.00803	.9887	.002
ASIAN	.5062	.3566	.123
OTHERMINORITY	N/A	N/A	N/A
MAJGRP2	-.2548	.2619	-.063
MAJGRP3	-.6647	.0042	-.161
PRIOR1	.3081	.4199	.076
YR84	.0193	.9645	.004
YR85	.0677	.8694	.016
YR86	-.2780	.5352	-.069
YR87	-.0198	.9670	-.004
YR88	.1708	.6744	.042
YR89	.0911	.8357	.022
YR90	-.3165	.4319	.078
YR91	.1814	.6698	.045
YR92	.4166	.3006	.102
YR93	.7684	.0571	.181
YR94	N/A	N/A	N/A
YR95	N/A	N/A	N/A
YR96	N/A	N/A	N/A
YR97	N/A	N/A	N/A
YR98	N/A	N/A	N/A
Log Likelihood Ratio = 25.91			
R-Squared = .0651			

Note: Statistically significant coefficients (at .01, .05, or .10 level) in bold

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LIST OF REFERENCES

- Bowman, W.R., & Mehay, S.L. (1999). "Graduate Education and Employee Performance: Evidence from Military Personnel." Economics of Education Review, 18, 453-63.
- Bowman, W.R. & Mehay, S.L. (2004). "Return on Graduate Education Investment." Presentation to Navy Graduate Education Conference, March 2004. Monterey, CA.
- Conzen, E.L. (1999). "An Analysis of the Impact of Fully Funded Graduate Education on the Retention of Naval Officers." Naval Postgraduate School Master's Thesis, Monterey, CA.
- Davids, K.B. (1998). "Retention of Junior Naval Special Warfare Officers." Naval Postgraduate School Master's Thesis, Monterey, CA.
- Fuchs, K.L. (1996). "The Effects of the Utilization of Graduate Education on Promotion and Executive Officer/Command Screening in the Surface Community: 1986-1994." Naval Postgraduate School Master's Thesis, Monterey, CA.
- Jordan, S.S. (1991). "An Analysis of the Impact of Graduate Education on the Performance and Retention of General Unrestricted Line Officers." Naval Postgraduate School Master's Thesis, Monterey, CA.
- Mehay, S.L. (2005). "The Value of Graduate Education in the Military." Presentation to the Turkish Military Academy, May 2005.
- Milner, C.G. (2003). "A Cost-Benefit Analysis of Early Graduate Education Programs for U.S. Naval Academy Graduates." Naval Postgraduate School Master's Thesis, Monterey, CA.
- Rilling, A.W. (1972). "The First Fifty Years of Graduate Education in the United States Navy, 1909-1959." University of Southern California Ph.D. Dissertation, Los Angeles, CA.
- Simons, W.E. & Higham, R. (Eds.) (2000). Professional Military Education in the United States: A Historical Dictionary. Westport, CT: Greenwood Press.
- U.S. Department of the Navy, Chief of Naval Operations. (1991). OPNAVINST 1520.23B (Subject: Graduate Education). Washington, D.C.

U.S. Naval Academy. (1981-2000). USNANOTE 1520 (Subject: Graduate Education Programs). Annapolis, MD.

U.S. Naval Academy. (1981-2000). USNAINST 1520.2 (Subject: Graduate Education Programs for Midshipmen). Annapolis, MD.

U.S. Naval Academy. (1982-2003). USNANOTE 1560 (Subject: Voluntary Graduate Education Program). Annapolis, MD.

U.S. Naval Academy. (1983-2004). USNAINST 1560.3 (Subject: Voluntary Graduate Education Program). Annapolis, MD.

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